Government College of Engineering :: Salem

(An Autonomous Institution Affiliated to Anna University, Chennai)

B.E. Degree Examinations – April/May 2022

V Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE501 – Power Generation Systems

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by diversity of load?
2. List the factors influencing the rate of tariff.
3. Compare Bab cock and will cox boiler.
4. Mention the benefits of green economizer.
5. Classify the hydrodynamic machines.
6. Specify the advantages of Kaplan turbine.
7. What are the means of cooling the reactor during the fission process?
8. Mention the possible hazards in nuclear power plant.
9. What the types are of filter opted in diesel engine power generation system.
10. How does a liquid metal MHD generator work?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A generating station has a maximum demand of 30MW, a load factor of 64%, a plant capacity factor of 54% and a plant use factor of 74%. Find, (8)

    i) The reserve capacity of the plant

    ii) The daily energy produced and

    iii) Maximum energy that could be produced daily if the plant while running as per schedule, were fully loaded.

    ii) A power station has the following daily load cycle : (8)

Time in Hours	6-8	8-12	12-16	16-20	20-24	24-6
Load in MW	20	40	60	20	48	20

Plot the load curve and load duration curve. Also calculate the energy generated per day.

(OR)

b) i) A consumer has a maximum demand of 300 kW at 40% load factor. If the tariff is Rs. 100 per kW of maximum demand plus 10 paise per kWh, find the overall cost per kWh. (8)

ii) Brief in detail about the types of tariff. (8)

12. a) i) Sketch the Layout of Thermal power station. (8)

ii) Compare the fire tube boiler and water tube boiler. (8)

(OR)

b) i) Compare solid fuel and pulverized fuel that aids in firing of boiler. (8)

ii) Write short notes on (8)

i) Evaporators

ii) Cooling tower.

13. a) i) Brief about the selection of site for hydro-electric plants. (8)

ii) Classify the hydro-electric plants and explain them. (8)

(OR)

b) i) Compare Francis turbine and Pelton turbine. (8)

ii) Brief about the major hydro-electric power stations in India. (8)

14. a) i) Illustrate the design of Nuclear power station. (8)

ii) Explain the process of controlling the fission process. (8)

(OR)

b) i) Compare the boiling water reactor and gas cooled reactor. (8)

ii) Brief about the impact of radio activity and methods to overcome. (8)

15. a) i) Draw the schematic arrangement for Diesel power generation and explain its operation. (8)

ii) Brief about the causes for oil contamination and suggest methods for oil purification. (8)

(OR)

b) i) Sketch the steam power plant in MHD power generation. (8)

ii) Brief about the gas cooled nuclear reactor in MHD generators. (8)

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B.E. Degree Examinations – April/May 2022

VII Semester (Part Time)

(2012 Regulations)

CIVIL ENGINEERING

12CEE01 - Hydrology

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Enlist the various forms of precipitation.
2. What are the methods available to find the average depth of precipitation over an area?
3. Define evapotranspiration.
4. What are infiltrometer and mention its types?
5. Distinguish between hyetograph and hydrograph.
6. What are the methods to determine the unit hydrograph?
7. Enlist the types of flood routing.
8. How can you classify flood control measures?
9. What are the assumptions made in derivation of Dupuits equations?
10. What is artificial recharge?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain with the help of a neat sketch about the hydrological cycle with its various components. (8)

ii) What is meant by Probable Maximum Precipitation? Describe the methods of estimating PMP. What are its design applications? (8)

(OR)

b) i) Describe the working principle of a non-recording type rain gauge with neat sketch, Mentioning its advantages and disadvantages. (8)

ii) How is precipitation measured? Discuss the three methods which convert the point precipitation to areal precipitation and comment on the best method. (8)

12. a) i) Explain with neat sketch the various methods of estimation of evaporation. (8)

ii) Define infiltration. Describe how infiltration capacity rate can be measured using double ring infiltrometer. How is better than a tube infiltrometer. (8)

(OR)

b) i) Explain with neat sketches how to evaporation is measured using evaporation pan. (8)

ii) State the Horton's equation for infiltration capacity curve and sketch with salient components of the curve. (8)

13. a) i) Describe briefly the procedure of preparing a D-hour unit hydrograph for a catchment. (8)

ii) A 3-hour unit hydrograph for a basin has the following ordinates. Using any suitable method, determine the 9-hour unit hydro graph. (8)

Time	0	3	6	9	12	15	18	21	24	27	30
Discharge	0	12	75	132	180	210	183	156	135	144	96

(OR)

b) i) List the factors affecting a flood hydrograph. Discuss the role of these factors. (8)

ii) The ordinates of one hour UH given at one-hour intervals are (m^3/sec) 0, 3, 8.5, 16, 20, 17, 12.5, 9.5, 7.5, 5.5, 3.5, 2, 1 and 0. Determine and plot the 2 hours UH by S-Curve method. (8)

14. a) i) Describe the various empirical methods used for the estimation of peak flood. (8)

ii) Describe the Muskingum method of channel routing. Assume the values of the coefficients K and X for the reach. (8)

(OR)

b) i) Describe the method of estimating a T'-year flood using Gumbel's method of distribution. (8)

ii) Explain the various methods of flood control in brief. (8)

15. a) i) Discuss the principle of recuperation test of an open well with a neat sketch. (8)

ii) Derive an expression for the steady state discharge of well fully percolated into a confined aquifer. (8)

(OR)

b) i) Explain with neat sketches various types of aquifers. (8)

ii) A 30 cm diameter well completely penetrates an artesian aquifer. The thickness of strainer is 25 m. Determine the discharge from the well when the draw down in the well is 4 m and the coefficient of permeability is 45 m/day. Assume radius of influence as 350 m. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CEPE07 – Repair and Rehabilitation of Structures

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the importance of maintenance.
2. Why is inspection needed for damaged structures?
3. How can you control cracks in a structure?
4. What are the types of cracks?
5. Name any two special mortars for repairs with applications.
6. State the application of ferro cement.
7. Mention any two causes of low strength in concrete members.
8. How do arrest the leakage in RC structures?
9. State the preventive measures taken during demolition.
10. What are the major factors considered in selecting a demolition procedure?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	Explain the various causes of deterioration of concrete structures.	(16)
		(OR)	
	b)	Explain the service life behaviour of a concrete structure. Also explain in detail about time based maintenance.	(16)
12.	a)	Explain in detail about quality assurance.	(16)
		(OR)	
	b)	Explain about the design errors and construction errors in concrete building.	(16)
13.	a)	Explain in detail about expansive cement.	(16)
		(OR)	
	b)	Explain in detail Fibre Reinforced Concrete.	(16)
14.	a)	Explain in detail about chemical disruption on concrete.	(16)
		(OR)	
	b)	Explain the various techniques available for repair of cracks.	(16)

15. a) Describe the preliminary procedures in demolition of a structure in detail. (16)

(OR)

b) What are the techniques available to demolish the structures? Explain any one with detailed case study. (16)

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VI Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18ECOE06 – Basics of Internet of Things

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. How do you define Internet of Things (IoT)?
2. What is the role of communication APIs in IoT system?
3. Define Machine to Machine (M2M) Technology.
4. What is the function of centralized network controller in Software Defined Networking?
5. Write any four Features of a ZigBee network.
6. What are the different types of actuators used in IoT system?
7. What is the difference between Python module and Python package?
8. What type of operating system is used in Raspberry Pi controller for IoT domain? Why?
9. Write the purpose of IoT based weather monitoring system.
10. Write any four real - time applications of IoT system.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Draw the general functional block diagram of IoT system and mention the key components present in it. (8)

    ii) List out the protocols used for IoT system. Explain the protocols used for application layer in IoT system. (8)

(OR)

    b) i) Explain the role of Cloud computing in IoT System. (8)

    ii) Describe the IoT level-5 architecture with suitable diagrams. (8)

12. a) i) Discuss the main difference between IoT and M2M technologies. (8)

    ii) Draw the architecture of Network Function Virtualization and explain how it can be used for virtualization of IoT devices. (8)

(OR)

    b) i) Draw the flowchart for steps involved in IoT system design methodology and mention its key functions involved. (8)

    ii) Draw the architecture of Software Defined Networks and mention its key elements. (8)

13. a) i) Discuss the functions of any four types of sensors used in IoT system. (8)

ii) Discuss the role of Zigbee networks in IoT based systems. (8)

(OR)

b) i) Draw the block diagram of a RFID system for IoT applications and services. Explain the main components used in it. (8)

ii) Explain how Wi-fi networks used as communication module in IoT based systems. (8)

14. a) i) List out the main characteristics of Python and suitability of Python in IoT system. (8)

ii) Draw the block diagram of IoT physical device and explain the different modules used in it. (8)

(OR)

b) i) Write short notes on Raspberry Pi controller and mention the Raspberry Pi interfaces for data transfer. (8)

ii) Write the Python program for controlling a LED with a switch in Raspberry Pi controller. (8)

15. a) i) Develop a Deployment design and service specification of the home automation IoT system. (8)

ii) Develop a schematic diagram for IoT based weather monitoring system and indicate the key components. (8)

(OR)

b) i) Explain how IoT used for Smart irrigation with functional diagram. (8)

ii) Design the IoT application models for Forest Fire Detection. (8)

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VI Semester (Full Time)

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ELECTRONICS AND COMMUNICATION ENGINEERING

18ECPE805 – System on Chip Design

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Identify the design issues of SoC.
2. Differentiate between soft cores and hard cores.
3. What are the necessary clock rules in SoC design?
4. List the deliverables for hard cores.
5. Define input offset voltage of an amplifier.
6. Compare SRAM and DRAM.
7. Classify test bench depending on the functionality of the core.
8. What is FPGA based emulation system?
9. What is the different test methodologies used in the production of SoC?
10. Compare various test methods for embedded memories.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the Virtual Socket Interface (VSI) Alliance design flow for SoC. (8)

ii) Discuss the general architecture of the embedded core based SoC. (8)

(OR)

b) i) Describe a general hardware –software co design methodology flow at high level. (8)

ii) Describe the Electronic Design Automation (EDA) tools that are useful in SoC design. (8)

12. a) i) What is the role of on chip buses in SoC design? (8)

ii) Explain the RTL synthesis based design process for soft and firm cores? Detail the additional considerations required by firm cores. (8)

(OR)

b) i) Explain the necessary physical design issues that are extremely important from the reuse point of view. (8)

ii) Describe the development process for hard cores. (8)

13. a) i) Explain the general flow of memory compilers. (8)

ii) Define all the functional parameters of analog to digital converters. (8)

(OR)

b) i) Discuss on the open loop and closed loop parameters of Phase Locked Loop (PLL). (8)

ii) Enumerate with examples the high speed interface circuits and I/Os in SoC design. (8)

14. a) Explain the test bench development for USB controller using bus functional model and a hardware software cosimulation. (16)

(OR)

b) Describe the SoC cosimulation validation flow. Illustrate how debugging can be done in a cosimulation environment. (16)

15. a) Discuss on the various SoC test issues. (16)

(OR)

b) Explain the implementation of Build in Self-Test (BIST) through Test Access Port (TAP) controller for ARM processor core. (16)

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VI Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18EEOE04 – Electric Vehicles

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the different types of electrification levels in EV?
2. Specify few terminologies associated with EVs.
3. Compare BEV and PHEV.
4. How solar powered EV operates?
5. Mention the selection parameters for an electric motor in EV.
6. How the electrical connection differs from the mechanical connection of motor?
7. Mention the difference between Lead Acid Battery and Lithium Ion Battery.
8. Specify the need for Battery Management System.
9. What are the different types of charging station?
10. Draw the Single Line Diagram suited for EV in Low distribution network.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Compare Electric Vehicles with Internal combustion Engine. (10)

    ii) Sketch the power flow Mechanical power transmission path (MPTP) and Electrical power transmission path (EPTP). (6)

    (OR)

    b) Brief about the Electric Vehicle Technology Scenario, Market scenario, Policies and Regulations. (16)

12. a) i) Compare the Fuel cell based EV and PV based EV. (8)

    ii) Describe the Electrical protection and system requirement. (8)

    (OR)

    b) i) Compare HEV and Plug-in HEV. (8)

    ii) Sketch the Photovoltaic solar based EV design and explain. (8)

13. a) Illustrate the torque-speed characteristics for power electronics based DC Motor drive framed in a two quadrant chopper controller circuit. Explain its working principle and discuss its operation using suitable waveforms. (16)

(OR)

b) Elucidate the necessary vehicle movement components and derive the motor sizing equations relating the tractive force, torque and efficiency. (16)

14. a) Discuss the cell charging and discharging operation of Lead Acid Battery using relevant diagrams and deduce the equations necessary for chemical reactions. (16)

(OR)

b) i) Write Short Notes on: (8)

1. State of Charge
2. State of Discharge
3. Depth of Discharge
4. Specific Energy and Power.

ii) Compare the rule based control and optimization based control in the Battery management System of EV. (8)

15. a) Explain the selection and sizing of EV charging Station in detail. (16)

(OR)

b) Discuss the components of EV charging stations with a neat sketch. (16)

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VI Semester (Full Time)

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ELECTRICAL AND ELECTRONICS ENGINEERING

18EEP10 – Utilization of Electrical Energy

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Differentiate load curve and load duration curve.
2. What are the desirable characteristics of tariff?
3. Define luminous intensity.
4. State cosine law of illumination.
5. What are the requirements of good heating material?
6. List the application of electric arc welding.
7. Draw the speed-time characteristics of suburban service.
8. Define metadyne.
9. Differentiate individual drive and group drive.
10. What is meant by load equalization?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) With a neat diagram explain the construction and operation of thermal power plant. (12)

ii) Elucidate about the function of tidel power plant. (4)

(OR)

b) i) A plant costs Rs.80,000 and has a useful life of 15 years. If the salvage value of the equipment is Rs.5,000 determine the amount which should be saved annually to replace the equipment at the end of the time by (12)

1. The straight line method
2. The sinking fund method. Assuming the annual rate of compound interest is 5%.

ii) List out the needs for electrical energy conservation. (4)

12. a) i) Derive the expression for the illumination at a point due to a perfectly diffusing surface source. (8)

ii) Explain briefly the construction and principle of operation of sodium vapour lamp. (8)

(OR)

b) i) Discuss the types of lighting schemes. (8)

ii) Write notes on: (8)

1. Requirements of good lighting
2. Nature of radiation.

13. a) Explain briefly the construction and principle of operation of induction heating and dielectric heating. (16)

(OR)

b) Describe briefly the construction and principle of operation of resistance welding and electric arc welding. (16)

14. a) i) Explain the quadrilateral speed time curve for a train with neat diagram. (8)

ii) The distance between two stations is 1.6 kms. And the average speed of the train is 40 kmph. The acceleration and retardation during coasting and breaking are 2 kmphps, 0.16 kmphps and 3.2 kmphps respectively. Assume a quadrilateral approximation of speed time curve, determine the duration of the accelerating, coasting and braking periods. (8)

(OR)

b) i) Discuss briefly about how the series parallel speed control is done on dc traction motors. (8)

ii) Describe briefly about how the regenerative braking applied to dc traction motors. (8)

15. a) Explain any one of the modern method of speed control applied to dc drives. (16)

(OR)

b) Describe briefly about how the dynamic braking is done using thyristors. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MEOE01 – Design of Machine Elements and Machining

(Use of PSG Design Data Book is Permitted)

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List four methods of reducing stress concentration.
2. How is factor of safety defined for brittle materials?
3. Define the term critical speed of a shaft.
4. Identify the possible modes of failure of riveted joint.
5. Classify the helical springs.
6. Compare the hydrostatic and hydrodynamic bearings.
7. Differentiate any two features of orthogonal and oblique cutting.
8. Identify any two reasons for formation of built up edges in the chip formation.
9. Predict the type of metal cutting process in drilling and turning operation.
10. Examine the work holding devices used for machining lengthy bar in center lathe.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A steel shaft 35 mm in diameter and 1.2 m long held rigidly at one end has a hand wheel 500 mm in diameter keyed to the other end. The modulus of rigidity of steel is 80 GPa. (8)

1. What load applied to tangent to the rim of the wheel produce a torsional shear of 60 MPa?

2. How many degrees will the wheel turn when this load is applied?

ii) A shaft is transmitting 97.5 kW at 180 r.p.m. If the allowable shear stress in the material is 60 MPa, find the suitable diameter for the shaft. The shaft is not to twist more that 1° in a length of 3 metres. Take C = 80 GPa. (8)

(OR)

b) i) A hollow shaft of 40 mm outer diameter and 25 mm inner diameter is subjected to a twisting moment of 120 N-m, simultaneously; it is subjected to an axial thrust of 10 kN and a bending moment of 80 N-m. Calculate the maximum compressive and shear stresses. (8)

ii) The load on a bolt consists of an axial pull of 10 kN together with a transverse shear force of 5 kN. Find the diameter of bolt required according to i) Maximum principal stress theory and ii) Maximum shear stress theory. (8)

12. a) i) Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5 (8)

ii) A line shaft is driven by means of a motor placed vertically below it. The pulley on the line shaft is 1.5 metre in diameter and has belt tensions 5.4 kN and 1.8 kN on the tight side and slack side of the belt respectively. Both these tensions may be assumed to be vertical. If the pulley be overhang from the shaft, the distance of the centre line of the pulley from the centre line of the bearing being 400 mm, find the diameter of the shaft. Assuming maximum allowable shear stress of 42 MPa. (8)

(OR)

b) i) A plate 100 mm wide and 12.5 mm thick is to be welded to another plate by means of parallel fillet welds. The plates are subjected to a load of 50 kN. Find the length of the weld so that the maximum stress does not exceed 56 MPa. Consider the joint first under static loading. (8)

ii) A 50 mm diameter solid shaft is welded to a flat plate as shown in Figure.1. If the size of the weld is 15 mm, find the maximum normal and shear stress in the weld. (8)

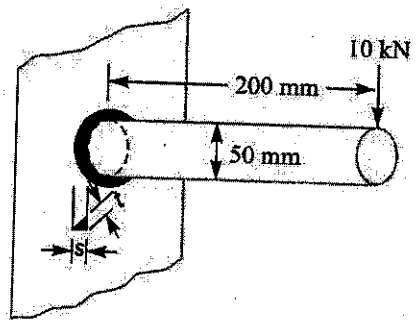

Figure.1.

13. a) i) A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm, find the axial load which the spring can carry and the deflection per active turn. (8)

ii) A mechanism used in printing machinery consists of a tension spring assembled with a preload of 30 N. The wire diameter of spring is 2 mm with a spring index of 6. The spring has 18 active coils. The spring wire is hard drawn and oil tempered having following material properties: Design shear stress = 680 MPa, Modulus of rigidity = 80 kN/mm, Determine: i) the initial torsional shear stress in the wire; ii) spring rate; and iii) the force to cause the body of the spring to its yield strength. (8)

(OR)

b) i) The load on the journal bearing is 150 kN due to turbine shaft of 300 mm diameter running at 1800 r.p.m. Determine the following i) Length of the bearing if the allowable bearing pressure is 1.6 N/mm^2. ii) Amount of heat to be removed by the lubricant per minute if the bearing temperature is 60°C and viscosity of the oil at 60°C is 0.02 kg/m-s and the bearing clearance is 0.25 mm. (8)

ii) Select a single row deep groove ball bearing for a radial load of 4000 N and an axial load of 5000 N, operating at a speed of 1600 r.p.m. for an average life of 5 years at 10 hours per day. Assume uniform and steady load. (8)

14. a) i) Derive the expression for shear angle in orthogonal cutting by applying the trigonometric relations. (8)

ii) Classify the chips and explain the conditions favoring for its formation in metal cutting. (8)

(OR)

b) i) Discuss about the mechanism of chip formation with a neat sketch. (8)

ii) Explain any three factors that affect the tool life in metal cutting. (8)

15. a) i) Explain any three drilling operations with suitable diagram. (8)

ii) Elaborate in detail about the construction of horizontal boring machine with suitable diagram. (8)

(OR)

b) i) Explain the construction and working of lapping process with neat line sketch. (8)

ii) Elaborate any four milling operations with simple sketch. (8)

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VI Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18MTOE02 – Surface Engineering

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention the functions of lubrication.
2. What is hard anodizing?
3. What is OAW hard facing process?
4. List the applications of thermal spray processes.
5. How will you measure the hardness of borided samples?
6. List the applications of Chromising.
7. What is reactive sputtering?
8. Mention the properties of diamond coatings.
9. Compare Wear sleeves and wear plates.
10. What is glazing?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Analyze the adhesive, abrasive, oxidative and corrosive wears in steel components. (16)

(OR)

b) i) Explain the electroplating of Chromium with neat sketches. (8)

ii) Explain the electroless plating of nickel with neat sketches. (8)

12. a) Explain the following hard facing processes: (16)

i) SMAW

ii) FCAW.

(OR)

b) Explain the Detonation gun and jet kote processes. (16)

13. a) Explain the Boriding and Aluminising diffusion processes. (16)

(OR)

b) Explain the Siliconising and Chromising diffusion processes. (16)

14. a) Discuss the following PVD processes: (16)

i) Sputter coating Method

ii) Ion plating Method.

(OR)

b) Explain the structure, properties and applications of TiC, TiN, Alumina and CBN coatings. (16)

15. a) Explain the Electron Beam Hardening and Ion implantation processes. (16)

(OR)

b) Discuss briefly the following: (16)

i) Surface Cements

ii) Wear tiles

iii) Ceramic coatings

iv) Centrifugal cast wear coatings.

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VI Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTMEE15 – Nano Technology

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Nano technology.
2. Write about molecular Nano technology.
3. Classify Nano composites.
4. What are synthetic nanoparticles?
5. What is the use of Nano scale?
6. Explain the energy band structure of Nano materials.
7. What do you mean by quantum dots?
8. Explain the applications of bio-nanotubes.
9. Discuss the uses of quantum wires.
10. Differentiate between carbon Nano tubes and graphene.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What is nanotechnology? Enumerate the changes of nanotechnology. (8)

ii) How do you classify Nano materials? Explain in brief. (8)

(OR)

b) i) Classify the types of Nano machines in detail. (8)

ii) Explain molecular Nano technology in brief. (8)

12. a) i) Explain gas condensation process for synthesis of Nano powders with a neat sketch? (8)

ii) Explain vapour condensation process employed for synthesis of Nano powders? (8)

(OR)

b) i) Explain SOL-GEL synthesis for producing Nano materials? Explain with the help of a neat sketch? (8)

ii) What are the advantages and disadvantages in mechanical synthesis of Nano powders? (8)

13. a) i) Describes the effect of Nano scale dimensions on various properties of Nano scale structures. (8)

ii) Define energy bands. Explain the energy band structure in metals, semiconductors and insulators. (8)

(OR)

b) i) Explain the importance of size and shape dependence of material properties at the nanoscale. (8)

ii) Distinguish between direct and indirect band gap semiconducting materials. (8)

14. a) i) Discuss in detail about applications quantum dots. (8)

ii) List out various applications of Nano in biology and their future perspectives. (8)

(OR)

b) i) Discuss about nanowire and nanotube along with their applications. (8)

ii) Explain about the nano 2D and 3D films with their applications. (8)

15. a) i) Describe in detail the role of Nano scale dimension on the structural and optical properties of materials. (8)

ii) Discuss the physical and chemical properties of Nano materials. (8)

(OR)

b) i) Describe in detail, the role of Nano scale dimension on the magnetic and electronic properties of materials. (8)

ii) Write down the applications of carbon Nano tubes. (8)

Government College of Engineering :: Salem

(An Autonomous Institution Affiliated to Anna University, Chennai)

B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCEE36 – Prefabricated Structures

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define prefabrication.
2. Define modular coordination.
3. List the components of prefabrication.
4. Define shear wall.
5. What is disuniting?
6. Define design efficiency.
7. List the joints in prefabrication.
8. State the tolerance for a horizontal joint.
9. List the abnormal loads.
10. Define progressive collapse.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the principles of prefabrication. (8)

ii) State and explain the materials used for prefabrication. (8)

(OR)

b) i) Explain standardization in prefabrication. (8)

ii) Describe the erection process. (8)

12. a) i) Explain the components of large panel construction. (8)

ii) Describe the process of construction of roof slabs. (8)

(OR)

b) i) Explain the construction of wall panels. (8)

ii) Describe the procedure of prefabrication of shear walls. (8)

13. a) i) Describe the process of disuniting. (8)

ii) Explain the procedure of design of cross section based on material. (8)

(OR)

b) i) How joint flexibility will be taken into account for design. (8)

ii) Describe the allowances for joint deformation. (8)

14. a) i) Describe different joints and connections. (8)

ii) Explain the dimension procedure for design of a joint. (8)

(OR)

b) i) Explain the detailing for joints. (8)

ii) State the procedure of design of expansion joint. (8)

15. a) i) Describe the codal provisions for progressive collapse. (8)

ii) Explain the procedure of avoidance of progressive collapse. (8)

(OR)

b) i) Explain the procedure for calculating equivalent design load for cyclone. (8)

ii) Describe the sequential procedure for calculating equivalent design load for earthquake. (8)

Government College of Engineering :: Salem

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

16PTECE23 – Digital Image Processing

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Compute the memory space required to store the 8 bit image with the resolution of 100 x 100. Compute the unit in bits.
2. Discuss the need of image transforms.
3. List the various gray level transformation techniques.
4. Discuss the effect of image sharpening.
5. A median filter with 3 x 3 masking window covers the following gray scale levels. Find the middle value of pixel using median filter procedure.
   X[n] = {9, 8, 1, 2, 3, 3, 7, 4, 5}.
6. Write the purpose of spatial transformation and gray level interpolation.
7. Discuss the term redundancy in image compression.
8. Compute the total number of symbols for the following words.
   i) ANNA UNIVERSITY
   ii) COMMITTEE.
9. Compute the first difference of 4 directional chain codes 0123332211.
10. List the properties of Fourier descriptor.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the elements of visual perception using necessary diagram. (8)

    ii) Explain how the image is digitized by sampling and quantization process. (8)

(OR)

b) i) Compute the 2D-DFT for the 4 x 4 gray images shown in the Figure.1. (8)

$$\begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{pmatrix}$$

Figure.1.

ii) Explain the properties of 2-D Fourier transform for an image. (8)

12. a) Write the theory on: (16)

i) Image subtraction and image averaging

ii) Types of image sharpening filter.

(OR)

b) An image has the resolution of 5 x 5 shown in the Figure.2. The image is need to histogram equalized. Perform the histogram equalization with proper steps and show the changes in image matrix value. And also write the expected changes in the image visualization after the histogram equalization. (16)

$$\begin{pmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{pmatrix}$$

Figure.2.

13. a) Explain: (16)

i) The gaussian, gamma, exponential, and uniform noise using suitable expressions.

ii) Various types of mean filter.

(OR)

b) Explain the constrained least square filtering for image restoration and derive its transfer function. (16)

14. a) i) Explain the bit plane coding using suitable example. (8)

ii) Explain the concept of LZW coding. (8)

(OR)

b) i) Explain the vector quantization procedure in detail. (8)

ii) Explain the various blocks of MPEG standard using suitable diagram. (8)

15. a) Explain the different types of boundary descriptors with suitable diagrams. (16)

(OR)

b) Explain: (16)

i) The concept and approach of chain code.

ii) The texture descriptions in region based representation.

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16ME603 – Finite Element Analysis

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by degrees of freedom?
2. Interpret the purpose of performing engineering analysis.
3. Why polynomial types of interpolation functions are mostly used in FEM?
4. State the properties of the stiffness matrix.
5. What is meant by plane stress analysis?
6. Distinguish between scalar and vector variable problems in 2D.
7. Define isoparametric formulation.
8. Name any four FEA software.
9. Write the governing equation for one dimensional heat conduction.
10. Write short notes on the one dimensional formulation of fin.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) List and briefly describe the steps of the Finite Element method. (16)

(OR)

b) Briefly explain the principles of variational methods and weighted residual methods with an example. (16)

12. a) Formulate the shape function for One-Dimensional Quadratic bar element. (16)

(OR)

b) For a tapered bar of uniform thickness t = 10 mm as shown in figure.1. Predict the displacements at the nodes by forming into two element model. The bar has a mass density ρ = 7800 kg/m³, the young's modulus $E = 2X10^5$ MN/m². In addition to self-weight, the bar is subjected to a point load P = 1 kN at its Centre. Also determine the reaction forces at the support. (16)

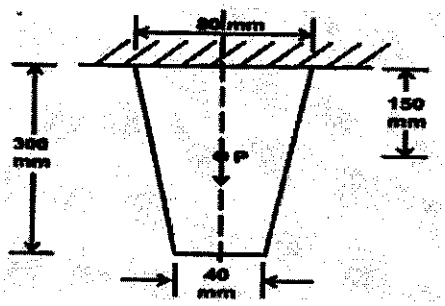

Figure.1.

13. a) Determine the shape functions for a constant strain triangular (CST) element. (16)

(OR)

b) Determine the shape functions N1, N2 and N3 at the interior point P for the triangular element shown in the figure.2. (16)

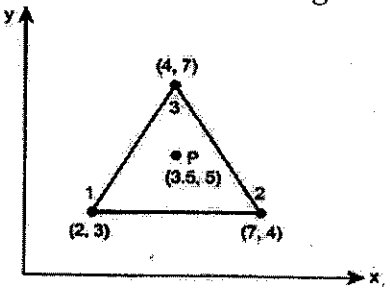

Figure.2.

14. a) Develop the shape function for a four noded isoparametric quadrilateral elements. (16)

(OR)

b) Consider the isoparametric quadrilateral element with nodes 1 to 4 at (5,5), (11,7), (12,15), and (4,10) respectively. Estimate the jacobian matrix and its determinant at the element centroid. (16)

15. a) Derive the FEA equation for one dimensional heat transfer element for conduction process. (16)

(OR)

b) A composite slab consists of three materials of thermal conductivities 12 W/mK, 20 W/mK, 40 W/mK and lengths 0.15 m, 0.3 m, and 0.2 m respectively. The composite slab has a uniform cross section of 0.05 m². The left end of the slab is at 500°C and the right end is exposed to the convective heat transfer coefficient of 12 W/m²K at 25°C. Determine the temperature distribution within the wall. (16)

Government College of Engineering :: Salem

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B.E. Degree Examinations – April/May 2022

V Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE503 – Design of Reinforced Concrete and Masonry Structures

(IS 456, IS 3370, IS 1905, SP 16 may be Permitted)

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is a punching shear in a RCC footing?
2. When you need a combined footing?
3. What is the function of shear key in retaining walls?
4. What are counterforts?
5. State the assumptions of equivalent frame method.
6. Show the yield line pattern of a triangular slab continuous on all edges.
7. Mention about the minimum reinforcement in walls of a RC water tank.
8. What is staging?
9. Define slenderness ratio for masonry walls and columns.
10. What are the conditions to be satisfied in the masonry structures for their stability?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Design an isolated footing for a column carrying an ultimate load of 800 kN. The size of column is 300x600mm. SBC of soil is to be taken as 250 kN/m². Use M20 grade of concrete and Fe 415 HYSD bars. (16)

(OR)

b) Design a combined footing for two columns C1 and C2 of size 800 x 800 mm and 600 x 600 mm carrying loads of 1500 kN and 1000 kN respectively. The width of footing is restricted to 2.2 m. The columns are spaced at 4 m c/c. The SBC of soil is 160 kN/m². Use M20 grade of concrete and Fe415 steel. (16)

12. a) Design the stem of a counter-fort retaining wall of 6.8 m height. The counter forts are 300 mm thick with the center to center distance between the counter-forts as 3.0 m The safe bearing capacity of soil is 180 kN/m², unit wt of soil is 18 kN/m³ and the angle of shearing resistance is 30°. Use M20 grade of concrete and Fe 415 steel. (16)

(OR)

b) Design a cantilever retaining wall to retain 5 m of horizontal backfill. Density of soil is 17 kN/m², Angle of internal friction of soil = 30°, SBC of soil = 165 kN/m², Coefficient of friction between base slab and concrete = 0.55. Use M20 Concrete and Fe 415 steel. (16)

13. a) An interior panel of a flat slab floor is 4.5m x 4.5m along column centre lines. Live load on floor is 4 kN/m².Supporting column diameters is 450 mm. Choosing the thickness of the slab (from stiffness criteria) and appropriate dimensions for column head and drops, design the slab. Use direct design method. (16)

(OR)

b) Find the Ultimate load for the following slabs simply supported on all edges carrying uniformly distributed load throughout the slab. (16)

i) Square slab

ii) Circular slab.

14. a) A circular water tank of capacity 350 m³ is covered with a circular dome and resting on ground having rigid joint at base. Depth of tank is 3.5 m with free board of 0.5m. Live load on the dome as 2 kN/m² including load due to floor finish. Design the following components. 1) Top dome 2) Top ring beam at the junction of wall and dome. Use M20 grade of concrete and mild-steel. (16)

(OR)

b) Design a R.C.C. rectangular water tank with an open top to store 80,000 litres of water. The inside dimensions of tank may be taken as 6 m x 4 m. Design the side walls of the tank using M20 grade of concrete and mild steel. Use approximate design method. Assume rigid joint at base. (16)

15. a) Determine the allowable axial load per metre length of a 200 mm thick solid wall. The height of the wall is 3.6 m. The length of the wall is 5 m. Assume allowable bearing stress as 0.55 Mpa. (16)

(OR)

b) Design an interior wall of a single storied residential building of height 4.5 m surrounded by RC roof. The bottom of the wall rests over a foundation block. Assume roof load equal to 45 kN/m. A pier is provided at a spacing of 3.6m along the length of the wall. (16)

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B.E. Degree Examinations – April/May 2022

V Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE503 – Total Quality Management

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Total Quality.
2. Explain the Principles of TQM.
3. List the tools used for feedback.
4. Illustrate the activities to be done using customer complaints.
5. Differentiate Population and Sample.
6. Brief the concept of Six Sigma.
7. Enumerate the steps to benchmark.
8. Draw the general structure of House of Quality.
9. Define Quality Audits.
10. Classify the four elements for the planning of ISO 14001.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	i)	Describe the various dimensions of quality.	(10)
		ii)	Explain about basic concepts of total quality management.	(6)
			(OR)	
	b)	i)	Describe the barriers in implementation of TQM.	(10)
		ii)	Explain about Deming Philosophy.	(6)
12.	a)	i)	Explain the different approaches towards continuous process improvement.	(10)
		ii)	Describe the characteristics of a successful team.	(6)
			(OR)	
	b)	i)	Describe how Kaizen is practiced in workplace.	(10)
		ii)	Draw PDSA cycle and explain.	(6)
13.	a)		Describe new seven tools of quality management.	(16)
			(OR)	
	b)		With example, explain six sigma concept.	(16)

14. a) Demonstrate in detail about benchmarking process. (16)

(OR)

b) Analyze in detail about Taguchi Quality Loss Function and Total Productive Maintenance. (16)

15. a) Explain various elements of ISO 9000:2000 quality system, their implementation and documentation. (16)

(OR)

b) Classify the major clauses of QS 9000 standard. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME404 – Dynamics of Machinery

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State D'Alembert's Principle.
2. Mention the reason why flywheel necessary in a punching press?
3. Write the reason why complete balancing of reciprocating masses is not possible in a single cylinder engine?
4. Why are the cranks of a locomotive, with two cylinders, placed at 90° to each other?
5. Define and write the expression of logarithmic decrement.
6. Define the term dynamic magnifier.
7. What do you understand by 'Torsionally equivalent shaft'?
8. Enlist the parameters measured using vibrometer.
9. Write a note on 'Hunting of Governors'.
10. Compare the Centrifugal governors from inertia governors.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) The length of crank and connecting rod of a horizontal reciprocating engine are 200 mm and 1.0 m respectively. The crank is rotating at 400 rpm. When the crank has turned 30° from the inner dead centre, the difference of pressure between the cover end and piston end is 0.4 N/mm^2. If the mass of the reciprocating parts is 100 kg and cylinder bore is 0.4 m. then calculate i) Inertia ii) Force on piston iii) Piston effort iv) Thrust on the sides of cylinder walls and v) Thrust in the connecting rod. vi) Crank-effort and vii) Turning moment on the crank shaft. Neglect the effect of piston rod diameter and frictional resistance. (16)

(OR)

b) A flywheel of mass 250 kg and radius of gyration of 600 mm is attached to a shaft. The shaft rotates at a speed of 200 rpm and drives a machine. The torque of the machines varies in a cyclic manner over a period of 3 revolutions. The torque rises from 250 Nm to 1000 Nm uniformly during first ½ revolutions and remains constant for next one revolution. It then falls uniformly to 250 Nm during the next ½ revolution and remains constant for one revolution, the cycle being repeated thereafter. Determine i) power required driving the machine and ii) percentage fluctuation in speed if the driving torque applied to the shaft is constant. (16)

12. a) Four masses 200 kg, 300 kg, 240 kg and 260 kg are attached to a shaft. These masses are revolving at radii 270 mm, 210 mm, 300 mm and 360 mm respectively in planes measured from A_1 at 270 mm, 420 mm and 720 mm respectively. The angles measured anticlockwise are m_1 to m_2 is 45°, m_2 and m_3 is 75°, m_3 to m_4 is 135° and distance between the planes L and M in which the balance masses are to be placed is 500 mm. The distance between the planes A_1 and L is 120 mm and M and A_4 is 100 mm. If the balancing masses revolve at a radius of 72 mm, find their magnitude and angular positions. (16)

(OR)

b) A two cylinder uncoupled locomotive has inside cylinders 0.6 m apart. The radius of each crank is 300 mm and is at right angles. The revolving mass per cylinder is 250 kg and the reciprocating mass per cylinder is 300 kg. The whole of the revolving and two third of reciprocating masses are to be balanced and the balanced masses are placed, in the planes of rotation of the driving wheels, at a radius of 1 m. The driving wheels are 2 m in diameter and 1.5 m apart. If the speed of the locomotive is 80 km/hr. find the hammer blow, maximum variation in tractive effort and maximum swaying couple. (16)

13. a) A mass of 7.5 kg hangs from a spring and makes damped oscillations. The time for 60 oscillations is 35 seconds and the ratio of the first and seventh displacement is 2.5. Find (16)

i) The stiffness of the spring and

ii) The damping resistance in N/m/s. If the oscillations are critically damped, what is the damping resistance required in N/m/s?

(OR)

b) A machine of mass 75 kg is mounted on springs of stiffness 1200 kN/m and with an assumed damping factor of 0.2. A piston within the machine of mass 2 kg has a reciprocating motion with a stroke of 80 mm and a speed of 3000 cycles /min. Assuming the motion to be simple harmonic, Find: (16)

i) The amplitude of motion of the machine
ii) The phase angle with respect to the existing force,
iii) The force transmitted to the foundation and
iv) The phase angle of transmitted force with respect to the exciting force.

14. a) The flywheel of an engine driving a dynamo has a mass of 180 kg and a radius of gyration of 30 mm. The shaft at the fly wheel end has an effective length of 250 mm and is 50 mm diameter. The armature mass is 120 kg and its radius of gyration is 22.5 mm. The dynamo shaft is 50 mm diameter and 200 mm effective length. Calculate the position of node and frequency of torsional oscillation. Assume $G = 83\ kN/mm^2$. (16)

(OR)

b) Write the Short notes with applications on the following (16)

i) Accelerometer
ii) Different types of Exciters
iii) FFT Analyser.

15. a) The mass of each ball in a Wilson-Hartnell governor is 2.5 kg. The length of ball arm of each ball-crank lever is 100 mm where as the length of the sleeve arm of bell-crank lever is 80 mm. The minimum equilibrium speed is 200 rpm. When radius of rotation is 100 mm. When the sleeve is lifted by 8 mm, the equilibrium speed is 212 rpm. The stiffness of each of the springs connected to the balls is 200 N/m. The lever for the auxiliary spring is pivoted at the midpoint. Find the stiffness of the auxiliary spring (16)

(OR)

b) The lengths of the upper and lower arms of a porter governor are 200 mm and 250 mm respectively. Both the arms are pivoted on the axis of the rotation. The central load is 150 N, the weight of each ball is 20 N and the friction of the sleeve together with the resistance of the operating gear is equivalent to a force of 30 N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 30° and 40°, determine the range of the speed of the governor. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE404 – Solid State Drives

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the mathematical expression for steady state stability of an electrical drive.
2. Draw the speed-torque characteristics of high speed hoist load.
3. Write the speed-torque equation for three phase fully controlled converter fed DC motor drive in continuous conduction mode.
4. What type of chopper is used for four quadrant operation of DC motor drive? Why?
5. Distinguish between voltage source and current source inverter fed induction motor drives?
6. What are the advantages of Direct Torque Control for Induction Motor Drives?
7. Distinguish between true synchronous mode and self-control mode in synchronous motor drive.
8. What are the advantages of Permanent magnet synchronous motor drives?
9. Why energy conservation is important in electrical drives?
10. Draw the sketch for solar pump drive employing permanent magnet DC motor.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Write a brief note on the essential parts of an electric drive with a block diagram. What are the functions of power modulator? (12)

ii) Drive the torque expression for motor load system with help of equivalent rotational system. (4)

(OR)

b) i) Describe the multi quadrant operation of an electric drive with motor/load torque characteristics. Also discuss the effect of speed variation and speed reversal. (12)

ii) Write the different modes of operation of an electrical drive with its speed-torque characteristics. (4)

12. a) Explain the principle of two quadrant operation in single phase fully controlled rectifier fed DC motor drive. Also derive the steady state speed-torque equation in continuous conduction mode. (16)

(OR)

b) A 230 V, 960 rpm and 200A separately exited DC motor has an armature resistance of 0.002 Ω. The motor is fed from a chopper which provides both motoring and breaking operations. The source has a voltage of 230V. Assume continuous conduction. (16)

i) Calculate duty ratio of chopper for motoring operation at rated torque and 350 rpm.

ii) Calculate duty ratio of chopper for breaking operation at rated torque and 400 rpm.

13. a) Explain the principle of V/f control for induction motor drive. How it is realized using voltage source inverters with power circuit? (16)

(OR)

b) Draw the power circuit for Static Scherbius drive and explain its operation with the help of equivalent circuit, mathematical expressions and speed-torque curves. (16)

14. a) Elaborate the operation of synchronous motor drive with self-control mode and summarize the salient features of self-controlled synchronous machine. (16)

(OR)

b) Explain the principle of vector control for cyclo converter fed synchronous motor drive with its functional block diagram. (16)

15. a) List the measures that could be taken to conserve energy in electrical drives. Explain how the variable speed drive allows saving of energy in pump drives? (16)

(OR)

b) Draw the circuit diagram and explain the operation of a battery powered DC motor drive for an electric vehicle without facility for regenerative braking. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE404 – Design of Steel Structures

(Use of IS 800 – 2007 & Steel tables are permitted)

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Specify the importance of HSFG bolts as connectors in steel structures.
2. Point any two limitations during the beam to column connections.
3. Mention the purpose of breech opening in self-supporting chimney.
4. Sketch neatly the Guyed Steel Chimney and mark the parts.
5. Write the factors influencing the torsional buckling.
6. Mention the significance of Interaction Equation.
7. Is stiffeners are essential for the plate girder? Justify.
8. List the components of gantry girder.
9. Draw neatly on Fink Truss and mark the parts.
10. I-section purlin (or) Channel section purlin, which is more sustainable and why?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Design a lap joint between the two plates each of width 120 mm, if the thickness of one plate is 16 mm and the other is 12 mm. The joint has to transfer a design load of 160 KN. The plates are of Fe410 grade. Use bearing type bolts. (8)

ii) Discuss in detail on the limitations of stiffened and seated connections in steel structures. (8)

(OR)

b) i) A tie member consists of two ISMC 250. The channels are connected on either side of 12 mm thick gusset plate. Design the welded joint to develop the full strength of the tie. However the overlap is to be limited to 400 mm. (8)

ii) Explain briefly the design procedure to be followed as per code of practice during beam-beam connections. (8)

12. a) Design for Delhi a self-supporting steel stack of height 72 m above the foundation. The diameter of the cylindrical part of the chimney is 3 m. The foundation has to be rest on medium soil having bearing capacity of 200 kN/m^2. The thickness of the fire brick work lining is 100 mm, and the lining is supported by the stack throughout the height. The chimney has one breach opening. The topography at the site is almost flat, and the location is of terrain category 2. (16)

(OR)

b) i) With a neat sketch, write the step by step procedure for design of guyed steel chimney. (8)

ii) Describe briefly the factors influencing the foundation design of various steel chimneys. (8)

13. a) i) Discuss in detail on the behavior of beam-column joint under wind loading. (8)

ii) Discuss in detail on the design considerations of beam-column under various loading conditions. (8)

(OR)

b) Design a single portal frame for an industrial building, assuming the length and height of the frame. Keep the support conditions as fixed. Adopt the design as per IS 875 code of practice. (16)

14. a) i) Compute the design flexural strength of a plate girder which consists of a 8 x 1800 mm web and 6 x 450 mm flanges. Use grade 410 steel and assume that the compression flange is continuously supported. (8)

ii) Define the term plate girder. Explain in detail on the components of plate girder with a neat sketch. (8)

(OR)

b) i) Define the term Gantry Girder. With a neat sketch, explain its components and functions. (8)

ii) Explain the detailed design procedure of Gantry Girder. (8)

15. a) Design the angle purlin by simplified method having the following details, spacing of trusses and purlins are 4m and 1.6 m, weight of sheets with fixtures = 0.205 kN.m^2, live load = 0.6 kN/m^2, wind load = 1 kN /m^2, inclination of main rafter of truss = 21°. (16)

(OR)

b) i) With a neat sketch, explain the different components of industrial roof truss. (8)

ii) Explain in detail on the design procedure of North Light Roof truss as per code of practice. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18ME404 – Strength of Materials

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State Hooke's Law.
2. Inspect the purpose of Mohr's Circle.
3. Identify any four assumptions made in theory of bending.
4. Infer principal stress and principal strain.
5. Outline any two limitations of Euler's formulae for columns.
6. Differentiate column and strut.
7. Model the mathematical expressions of Lame's theorem.
8. When the longitudinal stress in a thin cylinder does is zero?
9. When the hollow circular shafts are more suitable than solid circular shafts?
10. Compare helical spring and carriage spring.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A mild steel rod of 25 mm internal diameter and 400 mm long is enclosed centrally inside a hollow copper tube of external diameter 35 mm and internal diameter of 30 mm. The ends of the tube and rods are brazed together and the composite bar is subjected to an axial pull of 50 KN. If E for steel and copper is 200 GN/m^2 and 100 GN/m^2 respectively, determine the stresses developed in the rod and tube. (10)

ii) Formulate the relationship between modulus of elasticity and Bulk modulus. (6)

(OR)

b) i) At a certain point in a strained material, the stresses on two planes, at right angles to each other are 20 N/mm^2 and 10 N/mm^2 both tensile. They are accompanied by a shear stress of a magnitude of 10 N/mm^2. Determine graphically or otherwise, the location of principal planes and evaluate the principal stresses. (12)

ii) Discuss stress strain curve for mild steel andexplain about the silent points. (4)

12. a) Analyse the cantilever beam shown in figure.1 and sketch the the shear force and bending moment diagrams (16)

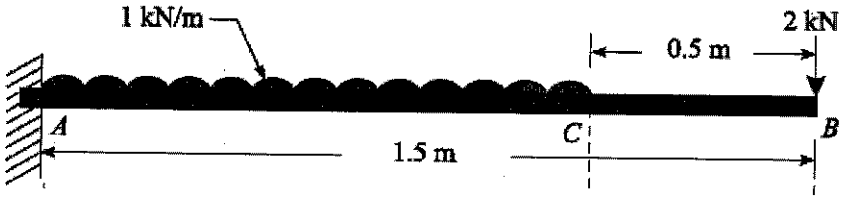

Figure.1.

(OR)

b) A cast iron beam is of I-section as shown in Figure.2. The beam is supported on a span of 5 metres. If the tensile stress is not to exceed 20 N/mm², Examine the safe uniformly load which the beam can carry. Determine also the maximum compressive stress. (16)

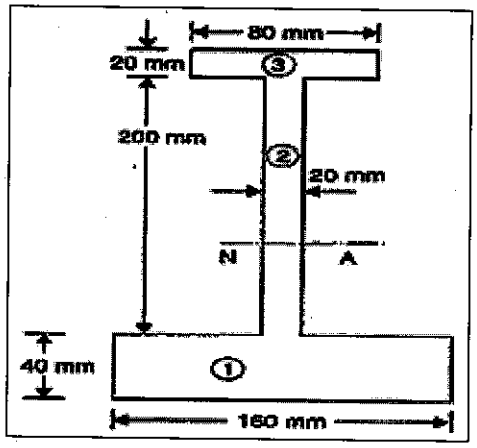

Figure.2.

13. a) A simply supported beam of length 4 m is loaded with a point load of 10 kN and 20 kN at a distance of 1m and 2 m respectively from the left support. The beam is 200 mm wide and 400 mm deep. Analyse the slopes at the supports, deflections under the loads and location and magnitude of the maximum deflections using Macualay's method. Take E = 2×10^5 N/mm². (16)

(OR)

b) A 1.2m long column has a cross section of 45 mm diameter, one of the ends of the column is fixed and other end is free. Taking factor of safety as 3, Analyse the safe load using, (16)

i) Rankine's formula, take yield stress = 560 N/mm² and a = 1/1600 for pinned ends.

ii) Euler's formula, taking Young's modulus for cast iron as 1.2 x10^5 N/mm².

14. a) i) A cylindrical thin drum 80 cm in diameter and 3 m long has a shell thickness of 1cm. If the drum is subjected to an internal pressure of 2.5 N/mm^2, determine: (12)

i) Change in diameter,

ii) Change in length and

iii) Change in volume. Take E = 2 x 10^5 N/mm^2 and Poisson's ratio = 0.25.

ii) Outline an expression for hoop stress in thin spherical shell. (4)

(OR)

b) i) A boiler is subjected to an internal steam pressure of 2 N/mm^2. The thickness of boiler plate is 2.6 cm and permissible tensile stress is 120 N/mm^2. Find the maximum diameter, when efficiency of longitudinal joint is 90% and that of circumferential joint is 40%. (12)

ii) Explain the concept of thick cylinder. (4)

15. a) A solid shaft is to transmit 300 kW at 100 rpm if the shear stress is not to exceed 80 N/mm^2. Determine the diameter of the shaft. If this shaft was to be replaced by hollow shaft of same material and length with an internal diameter of 0.6 times the external diameter. What percentage saving in weight is possible? (16)

(OR)

b) A closed coiled helical spring is required to absorb 2250 joules of energy. Determine the diameter of the wire, the mean coil diameter of the wire, the mean coil diameter of the spring and the number of coils necessary if i) the maximum stress is not to exceed 400 MPa, ii) the maximum compression of the spring is limited to 250 mm and iii) the mean diameter of the spring is eight times the wire diameter. For the spring material, rigidity modulus is 70G Pa. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18EE404 – Analog and Digital Integrated Circuits

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List any four ideal characteristics of an OPAMP.
2. Model an Integrator circuit using OPAMP.
3. Show the peak detector circuit using OPAMP.
4. What is the function of VCO? Mention its role in PLL.
5. Build a half subtractor using logic gates.
6. Construct the logic circuit for the following Boolean function using 8:1 multiplexer $F(A, B, C) = \sum m(1, 3, 5, 6)$.
7. Determine the characteristic equation of J-K Flip Flop.
8. Compare Moore and Mealy Circuit.
9. What is meant by primitive flow table?
10. Outline the causes of races in asynchronous sequential circuit.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Describe the external frequency compensation methods used in the operational amplifier to obtain large bandwidth and lower closed loop gain. (16)

(OR)

b) i) With neat sketch, explain the 3-OPAMP instrumentation amplifier circuit and derive the gain equation for the same. (10)

ii) Design an instrumentation amplifier with a voltage gain of 10. (6)

12. a) i) Describe the circuit operation of first order active low pass filter with a neat circuit diagram. Also derive the expression for its magnitude and phase angle. (10)

ii) With neat circuit diagram, illustrate the operation of Sample and Hold circuit using OPAMP. (6)

(OR)

b) Using Functional block diagram, Describe the operation of 555 timer IC as Monostable Multivibrator and derive the time period (T) of the same. (16)

13. a) i) Use karnaugh map, to minimize the following expression with don't cares. F (x_1, x_2, x_3, x_4) = ∑m (4, 6, 8, 10, 11, 12, 15) + d (3, 5, 7, 9). (10)

ii) Simplify the following Boolean expression and implement using logic gates. $\overline{A}BC + AB\overline{C} + A\overline{B}C + ABC$ (6)

(OR)

b) i) Implement the following function using 4:1 MUX, $AB + \overline{B}C$. (8)

ii) With the help of Truth table, design a full adder circuit and draw the circuit diagram using Gates. (8)

14. a) i) Draw the logic circuit and truth table of basic SR flip flop and analyse its operation. (8)

ii) Examine the basic operation of pulse triggered master slave JK flip flop with neat logic circuit diagram. (8)

(OR)

b) Design a 3 bit synchronous counter with T Flip flop and draw the logic circuit diagram. (16)

15. a) An asynchronous sequential circuit is described by the following excitation and output function (16)

$Y = X_1X_2 + (X_1 + X_2)Y$

$Z = Y$

i) Draw the logic diagram of the circuit

ii) Derive the transition table and output map.

iii) Describe the behavior of the circuit.

(OR)

b) i) Explain the types of hazards in digital circuits (8)

ii) Implement the switching function F = ∑m (1, 3, 5, 7, 8, 9, 14, 15) by a static hazard free 2 level AND-OR gate network. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18EC403 – Microprocessors and Microcontrollers

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is the function of IO/M signal in 8085?
2. List the different segment register in 8086.
3. What is meant by pseudo-operations or assembler directives?
4. What is BSR mode?
5. How Harvard architecture is different from Von-Neumann Architecture?
6. Differentiate RISC and CISC processors.
7. When are timer overflow bits set and reset?
8. What is meant by key bouncing?
9. Draw the CPU architecture of PIC Microcontroller.
10. What are the types of instruction set used in PIC microcontroller?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) With basic functional blocks explain the architecture of 8085 and instruction execution of 8085 microprocessor. (8)

    ii) With timing diagram, explain the memory read and write operation in 8085 microprocessor. (8)

(OR)

    b) i) What are the different addressing modes in 8085 microprocessor? Explain it with an example. (8)

    ii) With suitable examples, explain the program control instructions of 8085 microprocessor. (8)

12. a) i) Show the pin configuration and function of signals of 8086 microprocessor. (8)

    ii) Show the memory organization and interfacing with 8086 microprocessor. Explain how the memory is accessed. (8)

(OR)

b) i) Explain the data manipulation instructions of 8086 microprocessor. (8)

ii) Draw the internal architecture of 8086 microprocessor and explain its Bus Interface Unit (BIU). (8)

13. a) i) Differentiate Harvard and Von-Neumann Architecture with its advantages and dis advantages. (8)

ii) Explain the 8051 architecture in detail. (8)

(OR)

b) i) Explain the I/O pins ports and circuit details of 8051 with its diagram. (8)

ii) Explain about the register banks and special function register of 8051 in detail. (8)

14. a) i) Explain the various addressing modes in 8051. (8)

ii) Write detailed notes on 8051 timer and counter programming. (8)

(OR)

b) i) Draw and explain the ADC interfacing using 8051. (8)

ii) Explain how interrupts are handled in 8051. (8)

15. a) i) Explain the generalized architecture of PIC 16C6X. (12)

ii) Write the features of PIC microcontroller. (4)

(OR)

b) i) With neat diagram discuss in detail about memory organization of a PIC microcontroller. (12)

ii) What is watchdog timer? Explain it. (4)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CS403 – Object Oriented Programming Using C++

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is an inline function? When to use inline function?
2. List the applications of OOP.
3. How do we define member function outside the body of class?
4. Mention the operators which cannot be overloaded using friend function.
5. Define Abstract class. List its purpose.
6. Discuss the significance of this pointer.
7. What is meant by generic programming?
8. List the difference between Exception and Error.
9. How will you detect the end of file? Give example.
10. Define manipulator. List the manipulators available in C++.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the basic Concepts of object oriented programming. (10)

ii) Compare Procedure oriented programming and Object oriented programming. (6)

(OR)

b) i) Write a C++ Program to find the area of the square, rectangle, circle using function overloading. (10)

ii) Describe the C++ program structure. (6)

12. a) i) Construct a class for employee with id, name, basic pay, allowances, and deductions as data members and write member functions to calculate (net pay and gross pay), read and display the details. Write a program to create array of employee object and call the member functions. (8)

ii) Write a program to illustrate the friend function with suitable example. (8)

(OR)

b) i) Develop a class for Complex number. Write a constructor to initialize the member of complex number and overload the + (addition) and - (subtraction) operators. (8)

ii) Develop a program to illustrate conversion from basic data type into user defined object and user defined object into basic data type. (8)

13. a) Explain in detail about the different type of inheritance with suitable example. (16)

(OR)

b) Explain in detail about Virtual function. How will you implement runtime polymorphism? Illustrate with suitable example program. (16)

14. a) Develop a suitable program to illustrate function template and class template. (16)

(OR)

b) Analyze Exception handling mechanism with suitable example program. (16)

15. a) i) Explicate formatted I/O functions with example. (10)

ii) Explain stream class hierarchy in detail. (6)

(OR)

b) i) Write a program to store the student details into a file and read the student details from the file and display it to the user. (10)

ii) Describe the different file opening modes available in C++. (6)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18CEOE04 – Mechanics and Deformable Bodies

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State Hooke's law.
2. Define volumetric strain.
3. Write a note on sagging bending moment.
4. List the assumptions made in the theory of simple bending.
5. Quote the significance of Moment Area Method over double integration method.
6. What is the deflection formula for the cantilever beam of length 'l' carrying a distributed load when intensity varies uniformly from zero at the free end to 'w' per unit run at the fixed ends?
7. Mention the formula for circumferential stress.
8. Give the definition of principal strain.
9. Recall the various stresses in the shafts.
10. Reproduce the definition for angle of twist.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A square steel rod 20 mm X 20 mm in section is to carry an axial load (compressive) of 100 KN. Calculate the shortening in a length of 50 mm. Take E = 2.14 X 10^8 KN/m^2. (8)

ii) A hollow cast iron cylinder 4m long, 300mm outer diameter and thickness of metal 50mm is subjected to a central load on the top when standing straight. The stress produced is 75000 KN/m^2. Assume Young's modulus for cast iron as 1.5 X X 10^8 KN/m^2. Find magnitude of the load and longitudinal strain produced and total decrease in length. (8)

(OR)

b) i) A vertical tie of uniform strength is 20 metres long. If the area of the bar at the lower end is 600 mm^2, find the area at the upper end when the tie is to carry a load of 800 KN. The material of the tie weighs 80 KN/m^3. (8)

ii) For a given material, young's modulus is 110 GN/m^2 and shear modulus is 42 GN/m^2. Find the Bulk modulus and lateral contraction of a round bar of 37.5 mm diameter and 2.4m length when stretched 2.5 mm. (8)

12. a) Draw the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) for simply supported beam loaded as shown in the following figure.1. (16)

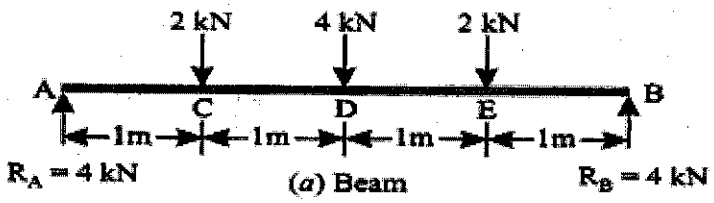

Figure.1.

(OR)

b) i) Derive an expression for the theory of simple bending. (8)

ii) Sketch the shear stress distribution of rectangular, circular and channel section. (8)

13. a) A beam with a span of 4.5 metres carries a point load of 30KN at 3 metres from the left support. If for the section I_{XX} = 54.97 X 10^{-6} m4 and E = 200 GN/m^2, find the deflection under the load and the position and amount of maximum deflection by Macaulay's method. (16)

(OR)

b) A hollow cast iron column whose outside diameter is 200 mm has a thickness of 20 mm. It is 4.5 m long and is fixed at both ends. Calculate the safe load by Rankine's formula using a Factor of Safety of 4. Take σc = 550 MN/m^2 and a = 1/1600. (16)

14. a) A cylindrical shell 2 m long and 90 cm internal diameter and 12 mm metal thickness is subjected to an internal pressure of 1.6 N/mm^2. Determine (a) maximum intensity of shear stress, and (b) changes in the dimensions of the shell. Take E = 2.1 X 10^5 N/mm^2 and 1/m = 0.3. (16)

(OR)

b) A short metallic column of 500 mm^2 cross sectional area carries an axial compressive load of 100 KN. For a plane inclined at 60° with the direction of load, calculate: (16)

1. Normal stress
2. Tangential stress
3. Resultant stress
4. Maximum shear stress
5. Obliquity of the resultant stress.

15. a) A solid circular shaft transmits 75 KW power at 200 rpm. Calculate the shaft diameter, if the twist in the shaft is not to exceed 1° in 2 metres length of shaft, and shear stress is limited to 50 MN/m^2. Take C =100 GN/m^2. (16)

(OR)

b) A hollow circular shaft 20mm thick transmits 294 KW at 200 rpm. Determine the diameters of shaft if shear strain due to torsion is not to exceed 8.6 X 10^{-4}. Modulus of rigidity as 80 GN/m^2. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CE404 - Water Supply Engineering

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Enlist the population forecasting methods.
2. Write down the factors affecting water demand.
3. What are the various materials used for water supply pipes?
4. List out the types of pumps.
5. Differentiate unit operation and unit processes.
6. Mention some coagulants.
7. How do you regenerate softener?
8. What is meant by Nalgonda technique?
9. Name the methods of water distribution.
10. Classify the methods used to find out Leakage in pipes.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What are the sources of water? Explain in detail. (8)

ii) Summarize the characteristics of water. (8)

(OR)

b) i) Illustrate the Impounding Reservoir. (8)

ii) Enumerate the Drinking Water Quality parameters as per BIS standards. (8)

12. a) Describe the Intake structures with neat sketch. (16)

(OR)

b) Explain briefly Laying, Joining and Testing of Pipes. (16)

13. a) i) Illustrate Clariflocculator. (8)

ii) Classify the various types of Aerators used in Water Treatment. (8)

(OR)

b) i) With neat sketch explain the Sand Filters with its merits and demerits. (8)

ii) Explain briefly on Break Point Chlorination. (8)

14. a) i) Discuss the methods of Desalination process. (8)

ii) Make a note on Adsorption. (8)

(OR)

b) i) Explain how to remove Iron and Manganese from Ground water. (8)

ii) Discuss the methods of Defluoridation. (8)

15. a) i) Describe the functions of Service Reservoir. (8)

ii) Sketch and explain the different layouts of Distribution Network. (8)

(OR)

b) i) Categorize the fixtures and fittings used for water distribution system. (8)

ii) Draw House Service Connection. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCEE20 – Repair and Rehabilitation of Structures

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the causes of deterioration?
2. Distinguish between repair and rehabilitation.
3. What are the factor effecting chemical attacks on concrete?
4. List any four causes of cracks.
5. What are the applications of sulphur infiltrated concrete?
6. What are the uses of gas forming and expansive chemicals?
7. How clamps are used to overcome low member strength?
8. Mention any two methods of making concrete structures leakage proof.
9. What are the major factors in selecting a demolition procedure?
10. How can you develop a demolition strategy?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Describe in detail about the prevention aspect of maintenance. (16)

(OR)

b) With a flowchart explain the assessment procedure for evaluate damages in a structure. (16)

12. a) Describe various components of quality control. (16)

(OR)

b) Discuss in detail about the thermal properties of concrete. (16)

13. a) Briefly explain about polymer concrete and its types. (16)

(OR)

b) Explain various corrosion protection methods. (16)

14. a) Explain the various strengthening technique to overcome low member strength. (16)

(OR)

b) Explain about the weathering action on concrete. (16)

15. a) Explain demolition process of a damaged structure. (16)

(OR)

b) Explain in detail about various demolition techniques. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

16PTECE20 – Medical Electronics

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Action Potential.
2. What is EOG?
3. What is the principle behind electromagnetic blood flow meter?
4. What is residual volume?
5. Compare CT and MRI system.
6. List the advantages of PET.
7. What is meant by fibrillation?
8. Write some application of LASER in medicine.
9. What are the devices used to protect against electrical hazards.
10. What is an automated chemical analyzer?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain Polarization, Depolarization and Repolarization in the generation of bio electric signals. (8)

ii) What are Bio-potential electrodes? Discuss the different types of Electrodes used in bio-potential measurement. (8)

(OR)

b) i) Draw the ECG signal wave form and explain its characteristics. (8)

ii) Discuss in detail the electrode-tissue interface. (8)

12. a) i) Write short notes on Audiometer. (8)

ii) Explain the methods used for Pulse measurement. (8)

(OR)

b) i) Discuss the applications of microprocessor in patient monitoring. (8)

ii) Explain any one Blood pressure measurement in detail. (8)

13. a) With block diagram explain the principle and operation of Computed Tomography. (16)

(OR)

b) With block diagram explain the principle and operation of MRI system. (16)

14. a) Discuss briefly about the various types and working of Cardiac pacemaker. (16)

(OR)

b) With neat diagram explain the principle and operation of the following: (16)

i) Hemodialysis

ii) Surgical instruments.

15. a) Discuss briefly about the importance and strategies involved for Electrical safety in hospitals. (16)

(OR)

b) Write short notes on (16)

i) Spectrophotometry

ii) Telemedicine.

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTMEE13 – Maintenance Engineering

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List out the types of availability.
2. Define mean time to repair.
3. Name the five 'S' principles used for implementation of TPM.
4. Differentiate break down and preventive maintenance.
5. State the benefits of reliability analysis in industries.
6. What is Weibull Distribution?
7. Define the term Computerized Maintenance Management System (CMMS).
8. List out the classification of records.
9. List out the steps for Vibration monitoring.
10. Differentiate On load testing and off load testing.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Briefly discuss about the classification of maintenance approach. (16)

(OR)

b) List out the factors affecting the machinability and explain it briefly. (16)

12. a) Briefly explain about the maintenance practices in lathe machine. (16)

(OR)

b) Discuss briefly about the spare parts procurement and inventory control methods with suitable example. (16)

13. a) Briefly discuss about hazard models and bath tub curve. (16)

(OR)

b) With the neat sketch briefly explain the reliability calculation for parallel, series and parallel-series system. (16)

14. a) How can computer be useful in maintenance planning? Explain it briefly with example. (16)

(OR)

b) Discuss briefly about the preventive and repair planning module with example. (16)

15. a) Briefly discuss about the various monitoring equipment and its applications. (16)

(OR)

b) Explain off line condition monitoring system and list out its benefits. (16)

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VI Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEEE11 – Energy Management System and SCADA

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by energy management program?
2. Mention any one load control scheme normally adopted in electric industry.
3. What are the factors involved in electricity cost?
4. List any two advantages of solid-state meter.
5. Mention the different light sources used in an industry.
6. What is cogeneration?
7. What is the main function of SCADA?
8. Why IEDs are used in SCADA?
9. Write the importance of SCADA in distribution system.
10. How the SCADA configured for substation monitoring?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	i)	Describe design and starting of an energy management program.	(12)
		ii)	Discuss utility rate structures.	(4)
			(OR)	
	b)	i)	Discuss in detail about energy monitoring, targeting and reporting.	(12)
		ii)	Illustrate the load demand control schemes.	(4)
12.	a)	i)	What the energy management strategies in transformers, and motors?	(4)
		ii)	Discuss in detail about utility meters.	(12)
			(OR)	
	b)	i)	Explain the role of demand meters in energy monitoring.	(12)
		ii)	What are the factors influence cost functions?	(4)
13.	a)	i)	What are factors influence the choice of light sources?	(8)
		ii)	Describe the cogeneration system.	(8)
			(OR)	

b) i) Mention the advantages of cogeneration system. (8)

ii) Detail the cost analysis techniques in lighting system. (8)

14. a) Elaborate the functional requirements and communication layout of SCADA. (16)

(OR)

b) Discuss in detail about remote terminal unit, interface unit, human-machine interface unit and data logger. (16)

15. a) Explain the substation SCADA system. (16)

(OR)

b) Elaborate the functional features of SCADA in transmission and distribution sector. (16)

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VI Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CEPE34 – Ground Improvement Techniques

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the difficulties faced with soft clay?
2. What is stone column?
3. What is a well point system?
4. List the various types of drains.
5. Define dynamic compaction.
6. What are the various methods of in-situ densification?
7. Define Geotextiles.
8. What is meant by reinforced soil?
9. Write the various classes of chemicals used in stabilization of soil.
10. Define grouting.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What are the factors influencing the selection of ground improvement techniques and discuss any two in detail? (8)

ii) What are the various geotechnical problems faced with black cotton soil? (8)

(OR)

b) i) Explain in detail the role of ground improvement in foundation engineering. (8)

ii) Write in brief about

a) Preloading (4)

b) Vibro Compaction. (4)

12. a) i) What are the various methods of dewatering? (8)

ii) What are the merits and demerits of deep well? (8)

(OR)

b) i) Explain the properties of flow net in detail. (8)

ii) Explain in brief the principle of electro-osmotic dewatering. (8)

13. a) i) How does a sand compaction pile improve the soil? (8)

ii) Explain in detail about the method of pre-loading. (8)

(OR)

b) i) How is a stone column installed by vibro-displacement method? (8)

ii) Explain the method of dynamic compaction of cohesion less soil. (8)

14. a) i) Explain in detail the various applications of reinforced earth for ground improvement. (8)

ii) Describe in detail about soil nailing and when is it adopted. (8)

(OR)

b) i) What are the various classifications of geosynthetics? (8)

ii) How do geosynthetics function as a filter? (8)

15. a) i) Write about the various methods of grouting. (8)

ii) Enumerate in detail about any one method of mechanical stabilization. (8)

(OR)

b) i) Describe in detail how chemicals are used in stabilizing the soil with the help of an example. (8)

ii) Describe the various applications of grouting. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18MEPE22 – Internal Combustion Engines

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the classifications of engines?
2. Define scavenge efficiency.
3. List down the different air fuel ratios required at different conditions of I.C. engines.
4. Compare electronic fuel injection system to carburetor?
5. Define knocking.
6. Classify the stages of combustion in a SI engines.
7. List the factors affecting ignition delay.
8. Give a comparative statement various characteristics that reduce knocking in S.I and C.I engine.
9. Construct the layout bio-diesel production.
10. Identify the major pollutants that are to be controlled by catalytic converters.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Function and operation of Two stroke and Four stroke engines with simple diagrams. (12)

ii) An engine uses 7 kg of oil per hour of calorific value 33000 kJ/kg. If the B.P of the engine is 24 kW and mechanical efficiency 80%, calculate: 1.Brake thermal efficiency; 2.Specific fuel consumption in kg/B.P/h. (4)

(OR)

b) i) A six cylinder, four stroke diesel engine has bore 350 mm and stroke 480 mm. A trial no the engine provided the following data. Mean area of indicator diagram = 780 mm^2, Length of the indicator diagram = 75 mm, Spring number = 0.7 bar per mm of compression, Brake torque = 14000 N-m, Speed = 500 r.p.m, Fuel Consumption = 240 kg/h, Calorific value of fuel oil = 44000 kJ/kg, Jacket cooling (12)

water = 320 kg/min, Rise in temperature of cooling water = 40°C, Piston cooling oil = 140 kg/min, Specific heat = 2.1 kJ/kg K, Temperature rise of oil = 28°C, Circulating water in gas calorimeter = 300 kg/min, Rise in temperature of this water = 42°C. All heat of the exhaust gases is absorbed in the calorimeter. Estimate the specific fuel consumption and mechanical efficiency of the engine. Draw up a heat balance sheet of the engine on 1 kg of fuel oil basis.

ii) Elaborate the Reverse or Loop scavenging. (4)

12. a) i) Function of carburetor with a neat sketch, name its different parts and explain. (12)

ii) What is MPFI system? (4)

(OR)

b) i) Explain different types of lubrication systems. (12)

ii) What are the Limitations of direct cooling system? (4)

13. a) i) Illustrate the stages of combustion in SI engines with a P-θ, elaborating the flame front Propagation. (12)

ii) Define heterogeneous mixture. (4)

(OR)

b) i) Describe the phenomenon of knock in SI engine combustion. (12)

ii) Elucidate high power output and thermal efficiency of an IC engine. (4)

14. a) i) Explain the following: (12)

1. Compression Ratio
2. Engine Speed
3. Injection Timing.

ii) Explain ignition delay period. (4)

(OR)

b) i) Identify the factors that influence the phenomena of knock in CI engines. (12)

ii) Explain swirl and squish. (4)

15. a) i) Classify the alternate fuels for SI engine. (12)

ii) List the Major exhaust emission, explain regulated and Unregulated emissions. (4)

(OR)

b) i) Explain briefly a flame ionization detector for measuring unburnt hydrocarbons. (12)

ii) Identify the factors which control the formation of oxides of nitrogen. (4)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CSPE609 – Computer Hardware and Troubleshooting

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Recall Central Processing Unit (CPU) in computer.
2. Compare Hard Disk Drive (HDD) and Compact Disk (CD) Drive.
3. Define Troubleshooting.
4. List the various types of chipsets.
5. Differentiate ROM and RAM memories.
6. Infer EPROM in computer system.
7. Define SMPS.
8. Indicate the features of CMOS battery.
9. List various types of Printers.
10. Infer the mechanism involved in printers.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the various the blocks available in a computer system with suitable diagram. (8)

ii) Classify the various types of computers based on its size and purpose. (8)

(OR)

b) i) Identify and explain the main components and peripherals associated with central processing unit (CPU). (8)

ii) Show the various components available inside the central processing unit (CPU) in detail. (8)

12. a) i) Explain in detail about the Cyrix Central Processing Unit. (8)

ii) Illustrate the overclocking in CPU in achieving the maximum speed. (8)

(OR)

b) i) Exemplify the concept of Intel chipsets with help of its various chipset number and processor family. (8)

ii) Elucidate the salient features of SIS Chipset in detail. (8)

13. a) i) Illustrate the SIMM and DIMM memory modules with suitable diagram. (10)

ii) Predict the physical RAM capacity and its organization in computer memory. (6)

(OR)

b) i) Analyze the importance of LX, LZ and EDO cache memories in detail. (10)

ii) Elucidate the following terminologies associated with computer memory: (6)

1. SRAM and DRAM
2. SSD and HDD
3. Compact Disk and Floppy Disk.

14. a) i) Explain the various drive components associated with floppy disk storage. (8)

ii) Show the various features of hard disk storage medium. (8)

(OR)

b) i) Examine the installation of drives and video cards in motherboard. (8)

ii) Explain the procedure to setup troubleshooting of the new installations. (8)

15. a) i) Explain the basic working principle of printers. (4)

ii) Illustrate the working of laser printer technology in detail. (12)

(OR)

b) i) Assess the importance of using different fonts and type faces in printing. (4)

ii) Summarize the steps involved in troubleshoot the printers. (12)

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VI Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18CSOE07 – Data Structures Using C++

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Compare Constructor and Destructor.
2. Define Reference Variable with an example.
3. Write a C++ program to find the sum of N numbers.
4. Recall how overriding is different from overloading.
5. Create a node of Singly linked list with two data (int and float) and one pointer.
6. List the applications of Stack.
7. Show the three types of tree traversal with example.
8. Illustrate a cyclic directed graph with example.
9. Differentiate between internal and external sorting.
10. Perform insertion sort on 20,3,4,1.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Create a friend function that can access distance variable from two different classes and display the total distance covered (Hint: Friend function should calculate total distance of two classes). (12)

ii) Define classes with member variables and functions to appropriately represent class hierarchy as shown in the figure.1. (4)

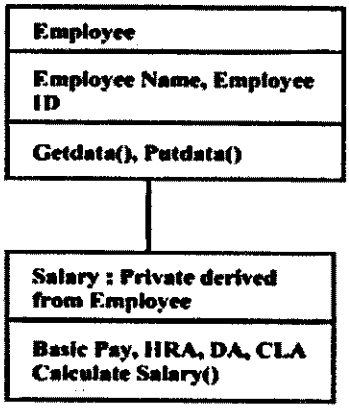

Figure.1.

(OR)

b) i) Write a C++ program to add two complex numbers using operator overloading. (12)

ii) Create a simple C++ program for function overloading. (4)

12. a) i) Explain Abstract and Concrete classes with example. (10)

ii) Discuss the order in which constructors and destructors are called in derived classes. (6)

(OR)

b) i) Consider a member function is defined in base class and redefined in derived class with suitable keyword. Identify the type of function and Write a C++ program defining member function suitably. (10)

ii) Explain Virtual Destructors with example. (6)

13. a) i) Write a C++ program to implement Stack ADT with basic operations. (10)

ii) Show the contents of stack for the following evaluation of postfix expression: 2536+**5/2-52^+. (6)

(OR)

b) i) Write a C++ program to add two polynomial expressions using Singly Linked List. (10)

ii) Discuss on Queue ADT. (6)

14. a) i) Build a min heap and a max heap for the following elements. 35, 33, 42, 10, 14, 19, 27, 44, 26, 31. Show max heap after deleting root once. (12)

ii) Insert the following elements in Binary Search Tree: 50, 60, 80, 90, 100, 200. Interpret the issue in this insertion. (4)

(OR)

b) i) Explain graph representations and traversals with example. (12)

ii) Write a routine to perform insertion in Binary search tree. (4)

15. a) Elaborate on Quick sort with example. (16)

(OR)

b) Explain Linear search and binary search algorithm with suitable examples. (16)

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VI Semester (Full Time)

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ELECTRICAL AND ELECTRONICS ENGINEERING

18EEP05 – High Voltage Engineering

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by insulation coordination?
2. What is meant by pilot streamer in lightning mechanism?
3. State Paschen's law.
4. Define intrinsic strength of a solid dielectric material.
5. Mention the necessity of generation of high DC voltages.
6. Why controlled tripping is necessary in an impulse generator?
7. Why capacitance voltage dividers are preferred for high AC voltage measurements?
8. State the basic principle of Rogowski coil.
9. Define 'Creepage distance'.
10. Mention the characteristics of water used in wet flashover test.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What are the causes of power frequency over voltages in a power system? Explain how they are controlled. (10)

ii) What are the causes of switching over voltages in EHV and UHV system? (6)

(OR)

b) i) Explain the different methods employed for lightning protection of overhead transmission lines. (10)

ii) Draw and explain the mathematical model for lightning discharges. (6)

12. a) i) Discuss the phenomenon of thermal breakdown in solid dielectrics. (8)

ii) Explain cavitation and bubble theory in liquid breakdown. (8)

(OR)

b) i) Discuss any two mechanisms of vacuum breakdown. (8)

ii) Derive the expression for current growth due to Townsend's primary ionization. Assume necessary data. (8)

13. a) i) Explain the working principle of Cockcroft-Walton voltage multiplier circuit with waveforms. (8)

ii) Derive an expression for total voltage drop and total ripple voltage of n-stage voltage multiplier circuit and hence deduce the condition for optimum number of stages. (8)

(OR)

b) i) Starting from the basic Marx circuit develop the circuit of a modern multistage impulse voltage generator and explain its operation. (8)

ii) Discuss the operation of three-stage cascaded transformer. (8)

14. a) i) Explain the principle and construction of an electrostatic voltmeter for very high voltages. (8)

ii) Explain the operation of Hall generator to measure high DC current. (8)

(OR)

b) i) With circuit arrangements, discuss the detailed procedure for measuring very high voltages using standard sphere gaps. (8)

ii) What are the different types of resistive shunts used for impulse current measurements? Discuss their characteristics and limitations. (8)

15. a) i) Discuss how various power frequency and impulse tests to be carried out on bushing. (8)

ii) With a neat circuit diagram, explain the procedure of synthetic testing of circuit breakers. (8)

(OR)

b) i) Discuss with a circuit diagrams, the detailed procedure for conducting impulse voltage testing of HV power transformers. (8)

ii) Explain the procedure adopted for detection and location of fault during impulse testing. (8)

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VI Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MTE31 – Non Metallic Materials

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is degree of Polymerization?
2. Identify the need of polymers in daily life.
3. List the various types of elastomers.
4. What is Crazing in polymers?
5. Compare conventional ceramics with advanced ceramics.
6. Mention the properties and applications of glasses.
7. Discuss the role of a matrix in a composite?
8. What are SMC? How are they produced?
9. What is the need for a Hybrid composite? Justify with a suitable example.
10. What are honeycomb structures? Give suitable example.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Discuss about the structure, properties and applications of the following polymers: PVC, PTFE, PET and Nylon. (16)

(OR)

b) List the various Polymer additives. Briefly explain the role of each additive in the manufacturing of Polymers with a suitable example. (16)

12. a) i) Name the method by which most of the thermoplastics are molded. Explain it with a suitable sketch. (8)

ii) What are elastomers? Explain about the different types of elastomers with their properties and applications. (8)

(OR)

b) What is the reason for yielding and fracture in polymers? Analyze and also explain it in detail. (16)

13. a) Discuss in detail about the production, properties and applications of Boron nitride, Silicon carbide and Boron carbide. (16)

(OR)

b) What is Glass? List the different types of glasses. Also, explain any two methods to manufacture glass with required sketches. (16)

14. a) What is a fiber? Explain the role of fiber in a composite. List the different types of fiber used in composites and explain the processing of carbon fiber in detail. (16)

(OR)

b) Explain the various production techniques for fiber composites. (16)

15. a) What is meant by Dispersion Strengthened composites? Explain the process of Dispersion strengthening. Also, list the applications of Dispersion Strengthened composites. (16)

(OR)

b) i) What are Laminar composites? Explain briefly and list their applications. (8)

ii) Few composites have skeletal arrangement in its structure. Name them and discuss the reason for their structure. List their advantages and applications. (8)

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VI Semester (Full Time)

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MECHANICAL ENGINEERING

18MEPE23 – Power Plant Engineering

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Why thermal plants are not suitable for supplying fluctuating loads?
2. Write down the purpose of condenser.
3. How power factor can be improved?
4. List any two merits and demerits of site selection of power plant.
5. Give an example for a low head turbine, a medium head turbine and a high head turbine.
6. Define the term 'Solar Photo Voltaic'.
7. Why is the maximum cycle temperature of gas turbine plant much lower than that of Diesel power plant?
8. State the fuels used in the gas turbine power plants.
9. What is chain reaction?
10. Define the term "Breeding".

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the construction and working of any one Fluidised bed boiler with a layout. (16)

(OR)

b) Draw a general layout of steam power plant with a neat diagram and explain the working of different circuits. (16)

12. a) Write short notes on CO_2 recorder and boiler inspection and safety regulations. (16)

(OR)

b) i) A residential consumer has 10 lamps of 40 W each. His demand is (10)

Midnight to 5 am – 40 W

5 am to 6 pm – no load

6 pm to 7 pm – 329 W

7 pm to 9 pm – 360 W

9 pm to midnight – 160 W

Plot the load curve. Calculate the average load, max load and demand factor.

ii) Explain the various types of cost associated with power generation. (6)

13. a) What are the various factors to be considered in selecting the site for a hydroelectric power plant and discuss about primary and secondary investigations. (16)

(OR)

b) Draw a schematic diagram of a solar power plant and explain the operation of it. Also mention its merits and demerits. (16)

14. a) How do you select engine for a diesel power plant? Draw a diesel power plant and explain its major components. (16)

(OR)

b) i) State the classification of gas turbine power plants. (8)

ii) Give the advantages and disadvantages of open cycle gas turbine power plant. (8)

15. a) Explain the construction and working of Nuclear power plant with a layout. (16)

(OR)

b) i) With neat sketch explain the boiling water reactor power plant its application. (8)

ii) With neat sketch explain the boiling gas cooled reactor power plant and its application. (8)

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VI Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CE604 – Professional Practice, Ethics and Building By-Laws

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State the importance of Corporate Ethics.
2. Differentiate Ethics and Engineering Ethics.
3. What is "Red Flag" condition?
4. Define Public-Private partnership.
5. Define the term Arbitration.
6. Compare Conciliation and Negotiation.
7. What is called piece rate work?
8. Why Piracy in Internet is plays a vital role?
9. Write about the patents law in India.
10. What is Copyright? Also state its historical revolution.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Write about the standardization body IRC. (4)

ii) Explain in brief about Institution of Engineers (India). (12)

(OR)

b) i) Write about Clients/ owners (role governed by contracts). (4)

ii) Explain in detail about Vigil Mechanism, Whistleblowing and Protected Disclosures. (12)

12. a) i) What is Indian Contract Act? Briefly explain about its amendments. (10)

ii) Briefly describe about Liquidated damages. (6)

(OR)

b) i) What is Reverse auction? Explain in detail about Reverse auction with a Case Study. (10)

ii) Give a brief note on various types of contract and their features. (6)

13. a) i) Write a short note on Lok Adalats. (4)

ii) Explain about Arbitration agreements. (12)

(OR)

b) i) State and explain about UNCITRAL model law. (4)

ii) Explain the procedure of appointment, challenge, jurisdiction of arbitral tribunal. (12)

14. a) i) What is Industrial Disputes Act? Write in detail about this act. (12)

ii) State and explain RERA act. (4)

(OR)

b) i) Explain the main roles of labour in Civil Engineering. (12)

ii) What is Workmen's Compensation act? (4)

15. a) i) Define IP. Explain the main forms of IP in detail. (10)

ii) State Infringement and their related remedies. (6)

(OR)

b) i) Define patent. Briefly explain about the steps involved in obtaining the patent. (10)

ii) What is trademark? State its role. (6)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING/ELECTRICAL AND ELECTRONICS ENGINEERING

18CSOE05 – JAVA Programming

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by command line arguments? Give an example.
2. Write a Java Program to read two numbers find the largest of two and display the result.
3. What is the use of final keyword in Java?
4. Why do we need abstract class in Java?
5. Write the syntax and example for passing parameters to Applet.
6. Create a Java Applet program to draw a smiley face.
7. What is Delegation Event Model?
8. What are the methods under Action Listener Interface, Item Listener interface and Window Listener Interface?
9. Define JDBC drivers.
10. What is the use of Prepared Statement in JDBC?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the features of Java. (8)

ii) Elaborate on the various object oriented concepts with necessary illustrations. (8)

(OR)

b) Explain the control structures in Java with suitable example. (16)

12. a) i) With illustrations, explain method overloading and method overriding in Java. (8)

ii) Develop an Interest interface which contains simple Interest and comp Interest methods and static final field of Rate 25%. Write a class to implement those methods. (8)

(OR)

b) i) With illustrations, explain thread life cycle and multithreading in Java. (8)

ii) Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num 2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num 2 were not an integer, the program would throw Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box. (8)

13. a) i) Explain the use of 'Super' keyword with suitable example. (8)

ii) Explain the life cycle of Java Applet with neat sketch and Give a simple example of Applet by html file. (8)

(OR)

b) Write a Java Applet program to draw different shapes (Lines, Rectanges, Circles, Squares, Arcs, ellipse, polygons) using graphics class. (16)

14. a) Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-*, % operations. Add text field to display the result. (16)

(OR)

b) i) Write a Java Applet Program to design three buttons named Red, Blue and Green using AWT button control and handle the event occurred through the button. (On Clicking the respective buttons, the colour of the background need to be displayed). (8)

ii) Illustrate Mouse Listener Interface and Key Listener Interface with suitable program. (8)

15. a) Discuss the architecture of JDBC with neat sketch. Illustrate how to establish connectivity using JDBC. (16)

(OR)

b) Write a Java program to demonstrate Input Stream and Output Stream and Character Stream. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CSPE604 – Python Programming

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State any four applications where python is popular.
2. Compare list and tuple in python.
3. State the reasons to divide program into functions.
4. Write the purpose of recursion.
5. List the uses of File object.
6. Give the differences between an error and exception.
7. Formulate regular expression pattern for the following: First character uppercase, contains lowercase alphabets, only one digit allowed in between.
8. What do you meant by method overriding?
9. How to create label widget in python?
10. State the need of persistent storage.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the different data types supported by python with an example. (8)

    ii) Write a python program to create dictionary and sort the content based on values in reverse order. (8)

(OR)

    b) i) List the three types of conditional statements and explain them. (8)

    ii) Write a python code to perform linear search. Trace it with an example. (8)

12. a) i) Write a python program using function to find the sum of first 'n' odd numbers and print the result. (8)

    ii) Explain about modules in python with an example. (8)

(OR)

    b) i) Write a python code to find factorial of a number using recursion. (8)

    ii) Explain about packages in python with an example. (8)

13. a) i) Explain different access modes for opening a file. (8)

ii) Describe how exceptions are handled in python with necessary example. (8)

(OR)

b) i) Write a python code to concatenate the contents of two files into a single file. Get the input for two files from the user and concatenate it. (8)

ii) Explain how does try-except statement work? Demonstrate with an example python code. (8)

14. a) i) Write a python program to overload plus operator that adds two objects of a class. (8)

ii) Explain the basic functions and meta characters of 're' module. (8)

(OR)

b) i) Implement multilevel inheritance in python with example. (8)

ii) Explain how python achieves parallelism and explain threading module objects. (8)

15. a) Consider a Python GUI program that produces a window with the following widgets using python code: (16)

i) A button to retrieve the next value in that list (if there is one). This button is displayed if there is no next value in the list.

ii) A label to display the number of the items being displayed and the total number of items.

(OR)

b) Give an overview and demonstration of building web applications using python's cgi module. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18MEPE14 – Renewable Energy System

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Solar Pond.
2. Express the basic principle of Solar Photo Voltaic conversion.
3. Classify different types of Wind power plant
4. List Main components of Wind Power Plant.
5. What is Biomass?
6. Summarize various biomass feedstock used for bio energy generation.
7. What is OTEC open cycle?
8. List the primary requirements for site selection of hydropower plant.
9. What is Geothermal Energy?
10. List down the factors affecting the fuel cell performance.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the performance analysis of Cylindrical Parabolic Concentrator. (8)

ii) Explain the various types of Photo Voltaic (PV) Systems. (8)

(OR)

b) i) What are the advantages and disadvantages of PV solar energy conversion system? (8)

ii) Explain the principle of operation of Fresnel lens collector. (8)

12. a) i) Explain the type of generator used in wind power plant. (8)

ii) Explain the main applications of wind power. (8)

(OR)

b) i) Express the pitch control and Yaw control. (8)

ii) Write short notes on wind energy collectors. (8)

13. a) i) Discuss the Anaerobic Digestion methods of biogas generation. (8)

ii) Describe in detail the various factors affecting bio digestion of a gas? (8)

(OR)

b) i) Express floating drum type biogas plants. (8)

ii) Explain the impacts of biomass construction, production and operation. (8)

14. a) i) Discuss, what is the minimum tidal range required for the working of tidal plant. (8)

ii) Describe in detail the operation of double basin type tidal power plant. (8)

(OR)

b) i) Illustrate OTEC open cycle along with its principle of operation. (8)

ii) Discuss the principle of operation of a simple single-effect tidal power plant and give a graph of sequential operating modes. (8)

15. a) i) Draw and Discuss the schematic layout of a tidal Power house. (8)

ii) Explain the application of geothermal energy. (8)

(OR)

b) i) Discuss about various fuel cells and its applications. (8)

ii) Explain the analysis of the energy content and its extraction for a hot dry rock type Geothermal resource. (8)

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M.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

COMPUTER AIDED DESIGN

18CDE42 – CAD/CAM Tools

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Differentiate point to point and continuous path machining.
2. Define Cellular Manufacturing.
3. List out the types of systems in CAD/CAM.
4. What are the input devices used in Programmable Logic Controller?
5. How does the tolerance analysis is used in design and manufacturing?
6. What is geometric tolerance?
7. List out the tools used in reverse engineering.
8. Define solid modelling with suitable example.
9. What is Coordinate Measuring Machines?
10. How tool path generation is done in APT?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Describe in detail about the various manufacturing process involved in CAM. (16)

(OR)

b) Differentiate between NC, DNC, CNC programming with valid example. (16)

12. a) Explain in detail about Programmable Logic Controller with a help of industrial example. (16)

(OR)

b) Explain about computer aided quality control. (16)

13. a) Differentiate between tolerance analysis and tolerance synthesis with suitable part model example. (16)

(OR)

b) Explain in detail about the contact and non-contact inspection methods. (16)

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COMMUNICATION SYSTEMS

18COE41 – Spread Spectrum Communication

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the applications of a sequence generator?
2. How do you generate a kasami sequence?
3. Distinguish between coherent and non-coherent spread spectrum system.
4. Analyze the significance of hybrid spread spectrum system.
5. Why do we have synchronization in spread spectrum system?
6. What are the causes of synchronization problem?
7. Define jamming margin.
8. Suggest the ways to improve the capacity of CDMA.
9. Mention the services provided by NAVSTAR Global Positioning System.
10. Draw a schematic diagram of basic differential GPS.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Illustrate the shift register generator that produces maximal length sequence. (12)

ii) Draw and explain the principles of a Gold sequence generator. (4)

(OR)

b) i) Illustrate a receiver that receives direct-sequence signal with dual quaternary modulation. (12)

ii) List the applications and advantages of complementary code keying. (4)

12. a) i) With necessary waveforms explain the principles of a direct sequence spread spectrum system. (4)

ii) Derive and analyze the processing gain of a direct sequence spread spectrum system. (12)

(OR)

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ELECTRICAL AND ELECTRONICS ENGINEERING/POWER ELECTRONICS AND DRIVES

18PEE45 – Power Electronics for Renewable Energy System

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the I-V equation and draw the characteristics of solar cell.
2. Why maximum power point tracking is needed for Solar PV system?
3. Write the power coefficient expression for wind energy system and mention its significance.
4. Write the advantages of permanent magnet synchronous generator used for wind energy conversion system.
5. Fuel cell is not an energy storage device. Justify.
6. Write the salient features of Bloom's energy server.
7. Distinguish between H5 and HERIC Inverter used for solar PV System.
8. What is the need of back to back PWM inverter in solar PV system?
9. What type of control scheme is most suitable for single stage grid connected PV system?
10. Write the requirements of grid integration of wind energy conversion system?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) How is a solar PV module different from a solar PV cell? How can a solar PV module be made using solar cells? (16)

(OR)

b) Draw the flow chart for the following MPPT algorithms and mention its salient features. (16)

i) Perturb and Observe algorithm

ii) Incremental Conductance algorithm.

12. a) List out the components of wind energy conversion system with suitable diagram and explain the function of each component. (16)

(OR)

b) Draw and explain the structure of an autonomous single-phase variable speed wind power generation for fixed speed or for the low voltage and narrow speed range. (16)

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CIVIL ENGINEERING/STRUCTURAL ENGINEERING

18STE44 – Design of Industrial Structures

(Use of IS 800, IS 804, IS 875, IS 4995, SP 6, SP 32 are permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. List the types of gantry girders.
2. Define stiffeners in plate girders.
3. Draw the fixed connection at the base of a portal frame.
4. List the requirements of a light weight structure.
5. State the difference between Jansen's theory and Airy's theory.
6. State the functions of ring girder in a silo.
7. Define breech opening.
8. State the stability consideration in a chimney.
9. State the function of stay in a water tank.
10. Draw the vertical joint in a pressed steel water tank.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Describe clearly the loads acting on a gantry girder. (8)

ii) Explain the design procedure of a gantry girder. (8)

(OR)

b) i) Describe the functions of each and every elements in a plate girder. (8)

ii) Explain the design procedure of a plate girder. (8)

12. a) A portal frame ABCD with hinged foot has stanchions 4 m high and beam of 6 m span. It carries an UDL of intensity 24 kN/m throughout the beam. Design the portal frame. (16)

(OR)

b) A gable frame with hinged bottom has 20 m span and 3 m rise. It is subjected an UDL of intensity 36 kN/m throughout the span. Design the gable frame. (16)

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THERMAL ENGINEERING

18THE45 – Modern Power Plant Engineering

(Steam table may be permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Classify the power plants.
2. What are the importances of a load curve?
3. Define air standard efficiency.
4. What are the functions of condenser?
5. What are the methods to improve the efficiency of a gas turbine cycle?
6. Identify the important component in the diesel power plant.
7. Compare topping and bottoming cycles.
8. Define heat to power ratio.
9. Classify hydel power plant.
10. What are environmental hazards due to nuclear power generation?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Brief about power generation statistics in India. (8)

ii) Describe briefly about the different costs involved in the power generation. (8)

(OR)

b) i) Discuss the important criteria for the selection a power plant. (8)

ii) Compare thermal power plant with nuclear power plant based on their performance characteristics. (8)

12. a) In a steam turbine steam at 20 bar, 360°C is expanded to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler. Assume ideal processes; find per kg of steam, the net workdone and the cycle efficiency. (16)

(OR)

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METALLURGICAL ENGINEERING/WELDING TECHNOLOGY

18WTE41 – Materials Characterization

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. How can you improve 'Resolving power' of a microscope?
2. Mention the use of In-situ metallography.
3. Define the term X-ray diffraction.
4. What is the relationship between tube voltage and wavelength of X-rays?
5. State the principle of Scintillation counter.
6. Analyze the significance of $(h^2 + k^2 + l^2)$ values.
7. List out the signals that are produced when an electron beam is incident on a solid sample.
8. What is 'Selected Area Diffraction' in TEM?
9. List the applications of X-ray fluoroscopy.
10. What is Thermo gravimetric Analysis?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Describe the working of polarized light microscope and state its applications. (8)

ii) Explain the procedure for specimen preparation for metallographic examination. (8)

(OR)

b) i) Explain the various methods of Grain size determination. (8)

ii) Enumerate the working principle of Phase Contrast Microscopy. (8)

12. a) Explain Laue method of X-ray diffraction. (16)

(OR)

b) Write short notes on intensity of diffracted beams and enumerate the structure factor calculations for BCC and FCC crystal structures. (16)

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MECHANICAL ENGINEERING

18CDE24 – Mechanics of Fracture

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State Griffith crack theory.
2. Why does brittle materials not have stable crack growth?
3. What is LEFM?
4. List the applications of Mode I fracture.
5. Differentiate CMOD and CTOD.
6. What is EPFM?
7. State the Paris law for fatigue crack growth.
8. Give any two limitations of S-N curve approach.
9. What is critical J integral?
10. Why mixed mode crack study is needed?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive the expression for fracture strength of brittle solid using Griffith energy balance. (8)

ii) List the important methods used to find crack in structural components and explain ultrasonic testing. (8)

(OR)

b) i) Illustrate the importance of fracture mechanics from the design point of view. (8)

ii) Determine the expression for effective crack length by Irwin's approach. (8)

12. a) i) What is stress intensity factor? Explain with neat sketch three different modes of fracture. (8)

ii) Explain Airy's stress function and complex stress function. (8)

(OR)

b) i) Explain the effect of thickness on fracture toughness and give the examples. (8)

ii) Discuss about small fatigue cracks and list the limitations of LEFM. (8)

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COMPUTER AIDED DESIGN

18CDE36 - Industrial Robotics and Expert Systems

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. How will you specify a robot?
2. Differentiate between path planning and trajectory planning.
3. List the various types of robot drive system for industrial robots.
4. In what way end effectors differ from human hand.
5. How does charge coupled device differ from charge induction device?
6. What are the techniques involved in segmentation?
7. Generalize the functions of work cell controller.
8. What is the importance of work envelope relating to robot safety?
9. What are the types of knowledge required for problem representation in AI?
10. Generalize some motion commands in VAL II.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What is meant by a manipulator having redundant degrees of freedom and write its advantages. (8)

ii) Discuss the features of cylindrical robot and also find the D-H matrix for cylindrical robot. (8)

(OR)

b) i) Discuss the anatomy of robot. (8)

ii) Explain the important parts of a robot with a neat sketch. (8)

12. a) i) Explain the working of hydraulic actuator system. (8)

ii) Discuss various considerations for selection of a gripper. (8)

(OR)

b) i) Explain vacuum grippers, with reference to the principle use and the application. (8)

ii) Explain magnetic grippers, with reference to the principle use and the application. (8)

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COMMUNICATION SYSTEMS

18COE31 – Wireless and Mobile Communication

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the technical challenges of wireless communication?
2. Mention any four wireless network standards with the type of communication.
3. List some indoor and outdoor propagation models.
4. Find the far field distance for an antenna with a maximum dimension of 1 meter and operating frequency of 900MHz.
5. Define Doppler spread.
6. What is Brewster angle? Calculate the Brewster angle for a wave impinging on a ground having permittivity of 7.
7. What are the functions of forward and reverse channels in mobile communication?
8. A total of 33MHz bandwidth is allocated to a FDD cellular telephone system which uses two 25 KHz simplex channels to provide full duplex voice and control channels. Compute the number of channels available per cell if a system uses 12 cell reuse
9. State the principle of diversity.
10. What is the purpose of RAKE receiver?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Discuss in detail about second generation (2G), third generation (3G), 4G and 5G wireless networks and standards. (16)

(OR)

b) Discuss the evolution of mobile radio communication. Explain any two examples of mobile radio system. (16)

12. a) Brief the basic propagation mechanism in mobile communication and deduce the expressions for the received power and path loss at distance 'd' from the transmitter using 2- ray ground reflection model. (16)

(OR)

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ELECTRICAL AND ELECTRONICS ENGINEERING

18PEE32 – Harmonics and Filters for Power Electronics Circuits

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List the sources of harmonics.
2. Compare Hartley and Wavelet transform.
3. What are the limits of Passive power filter?
4. Write down some of the mitigation techniques used in filters
5. Draw the circuit of shunt active power filter.
6. Mention the advantages of shunt active power filter.
7. Explain the role of series active power filter.
8. List the classification of Series active filter.
9. Mention the control strategies of Hybrid active filter.
10. List the applications of Hybrid active filter.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Describe the harmonic sources from commercial load. (8)

ii) Discuss about factors influencing the development of standards of harmonics. (8)

(OR)

b) i) Explain harmonic procedure by DFT tool. (8)

ii) Discuss about General Harmonics indices. (8)

12. a) i) Discuss briefly the series type of Passive Power Filters. (8)

ii) Discuss how the resonance problem is mitigated in the case and passive power filter? (8)

(OR)

b) i) Explain the Principle of Operation of shunt type Passive Power Filter. (8)

ii) Analysis and Design of Passive Power Filters. (8)

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POWER ELECTRONICS AND DRIVES

18PEE34 – Special Electrical Machines and Drives

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention any four permanent magnet materials.
2. Sketch the torque-speed characteristics of an ideal brushless DC motor.
3. List the types of Permanent Magnet Synchronous Motor.
4. Mention the industrial applications of Synchronous Reluctance Motor.
5. Write the basic voltage and torque equations of Switched Reluctance Motor.
6. What are the two types of current control techniques used for Switched Reluctance Motor?
7. Determine the step angle of a four phase stepper motor with 8 stator teeth and 6 rotor teeth.
8. Enumerate the various applications of Stepper motor.
9. Distinguish between 'Rotational EMF' and 'Transformer EMF' in an AC series motor.
10. State the principle on which a linear induction motor operates.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Draw the cross section and flux pattern of a 2-pole brushless DC motor, and its magnetic equivalent circuit. (4)

    ii) Explain briefly the constructional features and principle of operation of a brushless permanent magnet DC motor. (12)

(OR)

    b) i) Write the EMF and torque equations of a square wave permanent magnet brushless motor drive. (4)

    ii) Sketch the structure of controller for a brushless permanent magnet DC motor and explain the functions of various blocks. (12)

12. a) i) Derive the EMF equation of a brushless permanent magnet sine wave motor. (10)

    ii) Draw and explain the typical torque-speed characteristics of synchronous reluctance motor. (6)

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SCIENCE AND HUMANITIES

18PHDCY08 – Medicinal Chemistry

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define the term drug in relation to medicinal use.
2. Show uses of prodrugs.
3. Compare the medicine with heterocyclic group and hemocyclic group.
4. Rephrase application of terpenoids.
5. Develop a drug for alternative of alkanoids.
6. Compare hormone and vitamin.
7. Identify best antibiotic on the basis of its action and side effect.
8. List the application of SAR.
9. Compare the various biological target of drug.
10. Analyze the mechanism of action of histamine.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain classification of drugs on the basis of structure. (8)

ii) Illustrate drug metabolism of paracetamol. (8)

(OR)

b) i) Outline phase I and phase II reaction. (8)

ii) Summarize site and mode of action of antibiotics. (8)

12. a) i) Recall chemistry of pyrrol. (8)

ii) What is the structure relationship of heterocyclic compound? (8)

(OR)

b) i) Why heterocyclic drugs plays an important role in medicinal chemistry? (8)

ii) Spell medically important heterocyclic compound with its structure. (8)

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STRUCTURAL ENGINEERING

18STE36 – Design of Steel - Concrete Composite Structures

(Use of Relevant Codes are permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State the composite behavior of steel concrete member.
2. Write the application of steel concrete steel sandwich construction.
3. List the type of composite column is suitable in seismic region.
4. State the suitability of composite trusses.
5. List the main functions of shear connectors.
6. Compare flexible and rigid type shear connectors.
7. List the design concepts in box girder bridges.
8. Justify the reason, composite construction proves to be more advantageous for bridges.
9. Give the classical examples of composite structures.
10. Write the economic benefits of steel composite structures.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain with neat sketches the various types of steel concrete composite members. (8)

ii) Discuss the proportioning of composite members. (8)

(OR)

b) i) Investigate in detail the construction and maintenance issues of composite steel concrete structures. (8)

ii) Assess the failure mode of the steel concrete sandwich elements. (8)

12. a) The composite column of size 400 X 400 X 400 mm under the design axial load of 1500 KN and bending moment about XX axis is of 200 kNm with steel section ISMB 250 is at the center. Steel reinforcement is 4 No's of 12 mm dia bars. Check the adequacy of the Section for uniaxial bending. Adopt M30 and Fe 415 steel. (16)

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THERMAL ENGINEERING

18THE31 – Refrigeration and Cryogenics

(Refrigeration Tables may be Permitted)

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define COP.
2. Distinguish between dry and wet compression.
3. What are the methods of improving COP of a simple vapour refrigeration system?
4. Define volumetric efficiency.
5. List out the important properties of Liquid Neon as cryogenic fluid.
6. Why is Teflon used in cryogenics?
7. Distinguish Linde system and precooled Linde system.
8. What are the performance parameters to be considered in gas liquefaction systems?
9. List out the factors to be considered while choosing the insulation.
10. What is the need of pressure measurement in cryogenics?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Sketch the layout of vapour compression refrigeration system. (8)

ii) An ammonia refrigerator produces 20 tons of ice at O°C from water at O°C in 24 hours. The temperature range of the system is -15°C to 25°C. The vapour leaving the compressor's dry-saturated. (8)

Assuming actual COP is 75% of theoretical; calculate the power required to run the compressor. Use the following properties of ammonia.

Saturation Temperature	**Specific Enthalpy (kJ/kg)**		**Specific Entropy (kJ/kg K)**	
°C	h_f	h_g	s_f	s_g
25	99.94	1317.95	0.3469	4.4816
-15	-54.50	1303.74	-0.2132	5.0536

(OR)

b) i) Compare JT expansion and Isentropic expansion. (8)

ii) Explain Meissner effect and mention its significance. (8)

14. a) i) 1. Draw the schematic diagram for Linde-Hampson System (4+4)
2. Show the processes involved in this system on T-S diagram.

ii) 1. Derive the expressions for liquid yield in Linde-Hampson system. (4+4)
2. Drive the expressions for the work required per unit mass of the liquefied by considering the control volume enclosing the compressor for the System.

(OR)

b) i) Explain Gifford-McMahon refrigerator. (8)

ii) 1. Draw the schematic diagram for Claude System and write the salient features of the system. (4+4)
2. Draw T-s diagram for the Claude System. Derive the expressions for liquid yield in this system.

15. a) i) Describe two-phase flow in cryogenic fluid flow systems. (8)

ii) 1. Describe the cryogenic fluid storage system (Dewar vessel) with a neat sketch. (4+4)
2. Indicate all the elements in the sketch of Dewar Vessel.

(OR)

b) i) Describe in detail cryogenic fluid transfer systems with neat a sketch. (8)

ii) Explain the following types of Insulation. (8)
1. Expanded Foam
2. Gas Filled Powders and Fibrous Materials
3. Vacuum alone
4. Evacuated Powders.

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METALLURGICAL ENGINEERING/WELDING TECHNOLOGY

18WTE31 – Testing and Inspection of Weldments

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. List the methods used for hardness testing. Which hardness testing is used for soft and thin materials?
2. How to determine DBTT of a material?
3. Justify the pre-cleaning is an important step before non-destructive testing of weldments.
4. What is the principle of eddy current testing?
5. Define geometric unsharpness in radiography.
6. State the importance of exposure time in radiography testing of weldments.
7. What is beam spreading in ultrasonic testing and how to minimize it?
8. What is time of flight diffraction?
9. State the factors considered for assigning the 'P' numbers for pressure vessels as per ASME pressure vessel code.
10. Write the needs for Procedure Qualification Records.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the properties/information(s) that can be determined using tensile testing. (16)

(OR)

b) Explain the procedure to determine the toughness of any material. (16)

12. a) Explain the principle, procedure and applications of different dye system used in liquid penetrant testing. (16)

(OR)

b) Discuss the different methods used for magnetization and demagnetization during magnetic particle testing. (16)

13. a) Differentiate between the X-ray radiography and gamma ray radiography along with their applications, advantages and limitations. (16)

(OR)

b) Elaborate the problems associated with image formation in X-ray radiography. (16)

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WELDING TECHNOLOGY

18WTC21 – Welding Processes - II

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the advantages of electron beam welding?
2. What is hybrid welding?
3. What are the applications of electro-slag welding?
4. Compare the process between flash welding and projection welding.
5. List out the advantages of solid state welding processes.
6. What are applications of ultrasonic welding?
7. Draw the different zones present in friction stir welded sample.
8. What is mechanism of joining in friction welding process?
9. Name any two applications that are made by adhesive bonding.
10. Compare the difference between plasma welding and plasma cutting.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) With a neat sketch, explain the construction and working principles of electron beam welding. Enumerate its advantages, limitation and applications. (16)

(OR)

b) Discuss about the construction and working principle of laser beam welding with a neat diagram. List the advantages and limitations. (16)

12. a) Discuss the following welding processes in terms of principle of joining, equipment and operation: (16)

    i) Electro-slag welding

    ii) Electro-gas welding.

(OR)

b) With a neat sketch, explain the equipment set up and sequence of operation of i) seam welding and ii) upset welding processes. (16)

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THERMAL ENGINEERING

18THC21 – Advanced Heat Transfer

(Heat Transfer Data book may be Permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What are Heisler charts?
2. Why numerical modeling is important for heat transfer problems?
3. What are extended surfaces?
4. Define fin efficiency.
5. What is no slip condition?
6. Write the energy equation of the laminar boundary layer on a flat plate.
7. Show the different regimes on the boiling curve of water at 1 atm with surface heat flux as a function of excess temperature.
8. List out the assumptions made in Nusselt analysis for the heat transfer coefficient in film-wise condensation.
9. Find F_{11}, F_{12} and F_{21}.

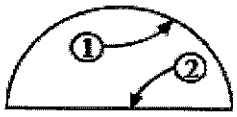

Figure.1.

10. Distinguish between gray body and black body.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) A steel rod [k = 50W/m°C] 3 mm in diameter and 10 cm long is initially at a uniform temperature of 200°C. At time zero it is suddenly immersed in a fluid having h = 50W/m² °C and T_∞ = 40°C while one end is maintained at 200°C. Determine the temperature distribution in the rod after 100 s. The properties of steel are ρ = 7800 kg/m³ and C = 0.47 kJ/kg °C. (16)

(OR)

13. a) Derive the momentum equation of the laminar boundary layer on a flat plate. (16)

(OR)

b) i) Explain the phenomenon of boundary layer separation. (10)

ii) Sketch the velocity distributions indicating flow separation on a cylinder in cross flow. (6)

14. a) Water is to be boiled at atmospheric pressure in a mechanically polished stainless steel pan placed on top of a heating unit. The inner surface of the bottom of the pan is maintained at 108°C. If the diameter of the bottom of the pan is 30 cm, determine (16)

i) The rate of heat transfer to the water and

ii) The rate of evaporation of water.

(OR)

b) The outer surface of a vertical tube, which is 1 m long and has an outer diameter of 80 mm, is exposed to saturated steam at atmospheric pressure and is maintained at 50°C by the flow of cool water through the tube. (16)

i) What is the rate of heat transfer to the coolant, and

ii) What is the rate at which steam is condensed at the surface?

15. a) A cylindrical furnace whose height and diameter are 5 m contains combustion gases at 1200 K and a total pressure of 2 atm. The composition of the combustion gases is determined by volumetric analysis to be 80 percent N_2, 8 percent H_2O, 7 percent O_2, and 5 percent CO_2. (16)

For a wall temperature of 600 K, determine the following:

i) The absorptivity of the combustion gases and

ii) The rate of radiation heat transfer from the combustion gases to the furnace.

(OR)

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MECHANICAL ENGINEERING

18CDC11 – Concepts of Engineering Design

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State the term concurrent engineering.
2. Why technological forecasting is needed?
3. Define Conceptual design.
4. What is geometric programming problem?
5. State the importance of Value engineering.
6. State the classifications of manufacturing process.
7. What is meant by statistical process control?
8. Write the objectives of failure model effect analysis.
9. What are the benefits of solid modeling?
10. What are important factors to be consider for mass property calculation?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Sketch a block diagram to explain the morphology of design and elaborate the activities in each of its phase. (16)

(OR)

b) i) Explain the steps involved in bench marking in design. (8)

ii) Write a short note on extended product life cycle. (8)

12. a) i) Explain any four types of product design specifications. (8)

ii) Write short note on decision tree. (8)

(OR)

b) i) Enumerate the role of simulation in product design. (8)

ii) Describe optimization in detail for design methods. (8)

13. a) i) Describe the material selection for a new product design. (8)

ii) Explain in detail the weighted Property Index of economics. (8)

(OR)

b) State the general design guidelines for Machining, Welding, Casting, forging, Metal forming and Assembly. (16)

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M.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

COMPUTER AIDED DESIGN

18CDC21 – Finite Element Methods in Design

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the structural and non-structural problems in FEM?
2. Differentiate between initial value problem and boundary value problem.
3. Illustrate shape function of a two node line element.
4. Express the element stiffness matrix of a truss element.
5. How do you define two dimensional elements?
6. Distinguish between plate and shell elements.
7. List the types of dynamic analysis problems.
8. Define mode superposition technique.
9. Write the conduction, convection and thermal load matrices for 1D heat transfer through a fin.
10. Define the stream function for a two dimensional incompressible flow.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the basic steps involved in finite element formation and explain in detail with example. (16)

(OR)

b) i) Discuss the effect of element shape and size on the convergence of the finite element method solution. (12)

ii) Distinguish between local and global coordinates. (4)

12. a) i) Derive the stiffness matrix for a one dimensional linear element. (10)

ii) Derive the force vector for a beam element. (6)

(OR)

b) Consider the truss element with the coordinates 1(10, 10) and 2(50, 40). If the displacement vector $\{ \delta \} = [15 \ 10 \ 21 \ 43]^T$ mm, then determine, (16)

i) Stress in the element

ii) Stiffness matrix, if E = 70 Gpa and A = 200 mm^2.

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M.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

COMMUNICATION SYSTEMS

18COC21 – Antennas and Radiating Systems

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define gain of an antenna. Mention the relationship between gain and aperture of an antenna.
2. Draw the radiation pattern for isotropic, directional and omnidirectional antenna.
3. What is the effective area of a half wave dipole operating at 1 GHz?
4. Compare short dipole from half wave dipole.
5. What are the advantages of Dolph-Tschebyscheff method?
6. Write a note on Binomial array.
7. What is significance of aperture of the antennas?
8. Give the relation between Directivity and effective area for optimum rectangular Horn antenna.
9. A parabolic reflector having the diameter of 2.1 m and used at 9GHz. Calculate the gain.
10. List the different types of analytical techniques used to analyze Microstrip antenna.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Briefly explain various types of antennas and their applications. (8)

ii) Explain radiation mechanism in single and two wire antennas. (8)

(OR)

b) i) Summarize the Friis equation of an antenna with diagram. Also explain the individual parameters in the equation. (8)

ii) Define the following parameters and their dependence on antenna performance (8)

1. Radiation pattern
2. Input impedance
3. Polarization.

15. a) i) With necessary sketches, explain in detail the radiation mechanism of a microstrip patch antenna. (8)

ii) Summarize various feeding techniques for the rectangular patch antenna with neat diagrams. (8)

(OR)

b) i) Discuss the parabola geometry that makes it a suitable for antenna reflectors. Develop an antenna employing a parabolic reflector that is likely to be a highly directive receiving antenna. (8)

ii) Discuss in detail various methods of feed of parabolic reflector antenna. (8)

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M.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

POWER ELECTRONICS AND DRIVES

18PEC21 – Modelling and Analysis of Electrical Machines

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the equation of dynamic model of dc motor with load.
2. What are the advantages of inter-poles in electrical machines?
3. What is meant by 3-phase to 2-phase transformation?
4. Draw the equivalent circuit of three phase induction motor.
5. What is meant by slip power recovery scheme?
6. Write the importance of constant air gap flux linkages in induction motor.
7. What is space vector modulation?
8. Differentiate direct and indirect vector schemes.
9. State the principle of PMSM?
10. What are applications of Stepper motor?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A series excited dc machine designed for a variable – speed application has the following name plate details and parameters: 3 Hp, 230V, 2000rpm, Ra=1.5 ohm R_{se}=0.7ohm, La = 0.12H, L_{se} = 0.03H, M=0.0675 H, B_1 = 0.0025 N.m /(rad/Sec). Calculate: i) The voltage required in steady state to deliver rated torque at rated speed ii) The efficiency at this operating. Condition assuming that a variable voltage source is available for this machine. (8)

ii) Write short notes on various methods of field excitation in DC motor. (8)

(OR)

b) i) Discuss in detail the effect of armature mmf in a DC machine. (8)

ii) Illustrate the commutator action in DC Machine. (8)

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MECHANICAL ENGINEERING

18CDE41 – Experimental Techniques and Data Analysis

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State the importance of calibration in instruments.
2. Mention the need of rosette analysis.
3. Highlight your views on Shadow graphs.
4. Can you write the principle of operation of Laser Interferometer?
5. State the stress optical law.
6. How will you express the accuracy of CMM?
7. List the steps in Hypothesis testing.
8. What do you mean by uncertainity?
9. State the need for experimentation.
10. What do you mean by Signal and scaling factor?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive the relation between stresses, relative retardation, material fringe value and thickness of photo elastic model. (10)

ii) Write the above relation in terms of strain. (6)

(OR)

b) i) Show how the change in output voltage is related to change in resistance of wheat stone bridge used for strain measurement. (10)

ii) Write short notes on piezo-electric transducers. (6)

12. a) i) With neat diagram explain the working principle of Rotameter. (8)

ii) With neat sketch explain the working principle of Pitot tube. (8)

(OR)

b) i) Illustrate the working of Bimetallic strip. (8)

ii) Write short notes on pyrometer. (8)

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M.E. Degree Examinations – April/May 2022

II Semester (Full Time)

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COMMUNICATION SYSTEMS

18COC22 – Advanced Digital Signal Processing

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List the necessary and sufficient condition for a random process to be wide sense stationary process.
2. State the Wiener-Khitchine relation.
3. Define bias and consistency.
4. Write the advantage of covariance method over autocorrelation method.
5. Compare parametric and non-parametric methods of spectrum estimation.
6. Define maximum likelihood criterion.
7. What is meant by linear prediction?
8. What is lattice structure? Give the advantage of such structure.
9. Mention the properties of adaptive filters.
10. What do you understand by the term channel equalization?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) When a process is said to be ergodic? Explain with proper equations and properties. (8)

    ii) Enumerate on the physical significance of spectral factorization. (8)

(OR)

    b) i) Discuss the autocorrelation method of forming finite data records. (8)

    ii) Explain the process of filtering random process with relevant expressions. (8)

12. a) Explain the Periodogram method of spectrum estimation in detail and also obtain the variance of the Periodogram. (16)

(OR)

    b) Explain Welch and Bartlett methods of power spectrum estimation and compare the two methods. (16)

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II Semester (Full Time)

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POWER ELECTRONICS AND DRIVES

18PEC22 - Modern Electrical Drives

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Why converters are used for the speed control of electrical drives?
2. What is meant by multi-quadrant operation of electrical drives?
3. What is the sequence at which the switches in the three phase fully controlled converter are turned on?
4. What is the function of freewheeling diode in 3-phase converters?
5. What is the use of equivalent circuit of three-phase induction motor?
6. Why the induction motor is not rotating at synchronous speed?
7. Give the torque expression in terms of stator and rotor fluxes, for 3-phase induction motor.
8. How flux vector estimation is carried out in induction machines?
9. What are the different ways of receiving variable voltage and variable frequency for a synchronous motor?
10. What are the disadvantages of the voltage source inverter fed synchronous motor?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the dynamics of motor load system with the help of fundamental torque equations. (8)

ii) Describe Ward Leonard method of speed control of DC motor. (8)

(OR)

b) i) Describe the components of torque and typed of load. (8)

ii) Describe the types of motor duty and selection of motor rating. (8)

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METALLURGICAL ENGINEERING/WELDING TECHNOLOGY

18WTC22 – Welding Metallurgy

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the effects of heat input and plate thickness on width of the heat effected zone?
2. Mention the purpose of preheating and when it is to be done.
3. List the causes for residual stresses in welds.
4. State the procedure to determine the hot cracking after welding.
5. Mention the significance of carbon equivalent in welding.
6. What are the effect(s) of Sulphur and phosphorous in welding of steels?
7. How to prevent hot cracking during welding of FSS?
8. What is sensitisation?
9. How to determine the percentage dilution in weld zone?
10. Suggest a suitable electrode material for welding of grey cast irons.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the different sources of heat energy in welding and the heat transfer equations used for determining heat input. (8)

ii) Compare the welding processes based on their heat flow characteristics. (8)

(OR)

b) i) Discuss the effect of welding parameters on weld metal solidification and microstructural changes. (8)

ii) Discuss the methods to control angular distortion and residual stresses in arc welding. (8)

12. a) i) Explain the reasons for hydrogen induced cracking and discuss the procedure to determine the above type of cracking. (8)

ii) Describe the causes and remedies for FOUR important weld defects. (8)

(OR)

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II Semester (Full Time)

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THERMAL ENGINEERING

18THC22 – Instrumentation for Thermal Systems

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention the factors affecting reliability of instruments.
2. Name the types of errors.
3. List the various ways through which data can be recovered from data acquisition system.
4. Mention the important characteristics of microprocessor.
5. Determine the mean free path of air at 20°C and pressure of 1 atm, 1 torr, 1μm and 0.01 μm.
6. Name the instruments that are used to measure thermo physical properties.
7. State the working principle of schlieren effect.
8. Mention the working principle of laser Doppler anemometer.
9. Define relative humidity.
10. What do you mean by primary moisture and secondary moisture?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Give a brief description about the various static performance parameters of the instruments. (12)

ii) Explain about the point to be remembered in the selection of the instruments in the value view point. (4)

(OR)

b) i) Describe about the dynamic characteristics of the selection of instruments. (10)

ii) Explain about systematic and random errors. (6)

12. a) i) Mention the building blocks of a data acquisition system with its application. (10)

ii) Explain the use of sensors for error reduction. (6)

(OR)

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Ph.D. Degree Examinations – April/May 2022

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CIVIL ENGINEERING

18STE41 – Design of Advanced Concrete Structures

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State the different limit states considered in the design.
2. Write the formula for calculating crack width.
3. Define: Slenderness ratio.
4. How shear wall is classified according to their behavior?
5. List down characteristics of yield line theory.
6. Draw a typical moment rotation curvature for simply supported beam under flexure.
7. Mention the methods of analysis of yield line slab.
8. Give the assumption in Baker' method of plastic design.
9. What are the factors available to increase ductility?
10. Narrate the effect of fire on steel structure.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A RC beam of size 250 mm x 500 mm is provided with 4 numbers of 20 mm diameters with an effective cover 40 mm clear horizontal spacing between bars is 35 mm. The section has to be resists the bending moment of 60 kNm. Use M20 and Fe 415 steel. Calculate the crack width at point P1 which is as tension edge just below the extreme and P2 which is at mid-point's' tension edge. (8)

ii) A beam size of 300 mm X 400 mm is reinforced with 2 numbers of 12 mm diameter bars at top and 2 numbers of 16 mm diameter bars at bottom. Use M20 and Fe 415. Take cover as 40 mm. Determine resistance of beam in pure torsion. (8)

(OR)

b) i) A 4 numbers of span continuous T beam of 4 m at each span is subjected to a characteristic load of 40 KN/m including its weight. Determine the ultimate moment capacity of the T – beam and it falls by plastic failure at the support at an ultimate load take load factor = 1.5. (8)

ii) A T beam ABC is continuous over two span of 8 m each and its carries uniformly distributed factored load of 75 KN/m assuming f_{ck} = 25 and fy = 415. Check whether we can reduce the maximum moment by 30% and redistribute to the spans. Width of flange 1000 mm, width of web = 300 mm, thickness of slab = 150 mm, D = 820 mm, d = 770 mm are given. (8)

15. a) i) Design a column of a multistory building for a ductility of M25 and Fe 415 subjected to an axial load of 2000 KN and bending moment of M = 416.67 KNm partial safety factor for a loads as 1.2. (12)

ii) Write in detail about the Longitudinal steel in beams. (4)

(OR)

b) Explain the four major requirements for ductile detailing columns. (16)

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M.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

STRUCTURAL ENGINEERING

18STC22 – Structural Dynamics

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What do you mean by damping? What are its forms?
2. Define the term: Dynamic load factor.
3. Write down the Duhamel's integral for finding out the displacement.
4. State the principle of direct integration method.
5. What do you mean by normal modes of vibration?
6. State the orthogonal property of mode shapes.
7. Write down the governing differential equation for flexural vibration of continuous systems.
8. When will you go for Rayleigh – Ritz method?
9. What do you understand by the term gust factor?
10. State the concept of base isolation technique.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A mass one kg is attached to the end of a spring with a stiffness 0.7 N/mm. Determine the critical damping coefficient. (6)

ii) For a system having mass 10 kg and spring constant 12 kN/m the amplitude decreases to 0.2 of the initial value after six consecutive cycles. Find the damping constant of the damper. (10)

(OR)

b) i) A steel rigid frame supports a rotating machine which exerts a horizontal force at the girder level of 50,000 sin11t N. Assuming 4% critical damping, what is the steady state amplitude of vibration? (Figure.1) Take mass m = 5000 kg, moment of inertia for columns $I = 1500 \times 10^{-7}$ m^4. $E = 21 \times 10^{10}$ N/m^2. (8)

b) Determine the natural frequencies and mode shapes for the framed structure shown in figure.5. The floor is considered to be absolutely rigid. (16)

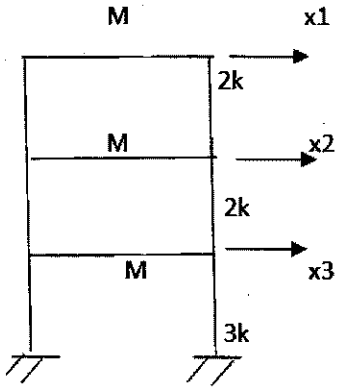

Figure.5.

14. a) Derive an expression for natural frequencies of transverse vibration of an uniform fixed – fixed beam. (16)

(OR)

b) Derive an expression for the transverse vibration of a uniform beam. Hence find the natural frequencies and mode shapes of a simply supported beam. (16)

15. a) i) Discuss how you will analyze a building which is subjected to blast loading. (8)

ii) Differentiate between along wind response and across wind response of a structure subjected to wind loading. (8)

(OR)

b) Write short notes on the following:

i) Gust response factor (4)

ii) Vibration aspects of machine foundations (4)

iii) Seismic base isolation (4)

iv) Mathematical modelling for blast loading. (4)

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M.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

COMPUTER AIDED DESIGN

18CDC22 – Mechanical Vibrations and Acoustics

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Write some of the materials used for vibration isolation.
2. How we can reduce the undesirable vibrations?
3. Define the flexibility and stiffness influence coefficients. What is the relation between them?
4. What is the usefulness of Dunkerley's Method?
5. State the Euler's equation of motion for beam vibration.
6. Distinguish between transient and random vibrations.
7. List out the vibration measuring instruments.
8. State the three types of maintenance schemes used for machinery.
9. State the principle of noise absorbers.
10. Give the relationship between frequency, wavelength, and velocity.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A vibrating 150 kg mass is supported on spring stiffness of 2 MN/m and has a rotating unbalance force of 600 N. If the damping factor is 0.3, determine (10)
    1. The amplitude of vibrations, and
    2. The transmissibility at an operating speed of 1500 rev/min.

    ii) Elaborate clearly the significance of under-damped, over-damped and critically-damped systems in free vibration systems with viscous damping. (6)

(OR)

b) A printed circuit board of mass 1 kg is supported to the base through an undamped isolator. During shipping, the base is subjected to a harmonic disturbance (motion) of amplitude 2 mm and frequency 2 Hz. Design the isolator so that the displacement transmitted to the printed circuit board is to be no more than 5% of the base motion. (16)

15. a) i) Discuss the generic ways with which we can control noise. (10)

ii) Discuss the simple solutions for acoustic wave equation. (6)

(OR)

b) i) Explain the working principle of any two instruments used for acoustic measurement. (10)

ii) Explain the use of Sound Level Meters in noise measurement. (6)

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Ph.D. Degree Examinations – April/May 2022

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18PEE61 – Electric Vehicles

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the electrical components of a hybrid electric vehicle?
2. Draw the electric motor and IC engine speed-torque characteristics.
3. List out the different types of alternative vehicle technologies.
4. What type of braking employed in electric vehicle? Mention its advantages.
5. Why four quadrant operations are needed for electric vehicle drive?
6. Mention the significance of vector control for AC machines used in Electric Vehicle.
7. Identify any four types of rechargeable batteries used for electric and hybrid vehicle applications.
8. Draw the circuit for Run-Time Battery Model.
9. Draw the VI characteristics of hydrogen fuel cell and mention its voltage expression.
10. How Ultra-capacitor differs from battery?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Draw the functional block diagram of an electric vehicle system and indicate the sub systems and their functions. (10)

    ii) Elaborate the points to be considered for selection of Electric Motor and Engine Ratings for a Hybrid Electric Vehicle. (6)

    (OR)

    b) i) Compare the features of Electric vehicle with Internal Combustion Engine Vehicle on the basis of efficiency, pollution, and operating cost. (10)

    ii) Discuss the modelling of vehicle kinetics and roadway with necessary mathematical expressions. (6)

12. a) i) Draw the structures of parallel Hybrid Electric Vehicle power train and explain the merits and demerits of both structures. (10)

    ii) Explain how the size of electric motor is selected for Hybrid Electric Vehicle power train? (6)

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Ph.D. Degree Examinations – April/May 2022

(2018 Regulations)

SCIENCE AND HUMANITIES

18PHDCY05 – Molecular Spectroscopy

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define electromagnetic radiation.
2. Recall methods for enhancement of spectra.
3. Compare raman and IR spectroscopy.
4. Illustrate woodward rule for benzoquinone.
5. Identify the main peaks in NMR for pthalic acid.
6. Choose the solvent of H and C-13 NMR.
7. Organize various components in mass spectroscopy.
8. List the uses of mass spectroscopy.
9. Compare Mossbuer spectroscopy with other spectroscopy.
10. Analyze the radiation source used in Mossbauer spectroscopy.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain practical application of Rotational spectroscopy. (8)

ii) Illustrate the component used in microwave spectroscopy. (8)

(OR)

b) i) Outline the steps used in enhancement of spectra. (8)

ii) Summarize basic elements of practical spectroscopy. (8)

12. a) i) Recall the application of group theory. (8)

ii) What is harmonic and anharmonic vibration? (8)

(OR)

b) i) Why electronic transition occurs in UV-Visible region? And explain with an example. (8)

ii) Spell the solvent effect in UV spectroscopy. (8)

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Ph.D./M.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING/STRUCTURAL ENGINEERING

18STC21 – Finite Element Method in Structural Engineering

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define the Principle of Minimum Potential Energy.
2. What are the properties of stiffness matrix?
3. What are the four elastic equations?
4. Define Galerkin Finite Element Method.
5. Explain the purpose of isoparametric elements.
6. Write down the stress-strain relationship matrix for an axisymmetric triangular element.
7. What are the required conditions for the problem to be axi-symmetric?
8. Write the stress-strain and strain-displacement matrix of CST element.
9. List some of the Finite Element Method Software.
10. Write the step by step procedure in Finite Element Method.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Determine the displacements of nodes 1 and 2 in the spring system. Use minimum of potential energy principle to assemble equation of equilibrium. (16)

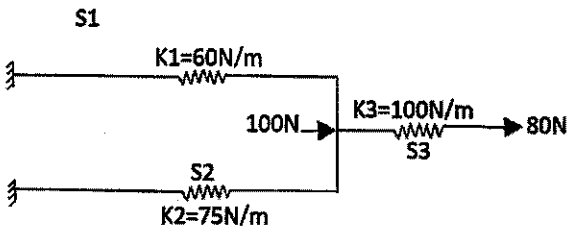

Figure.1.

(OR)

b) For the Axisymmetric elements, Determine the element stresses. Let E = 210 GPa and γ = 0.3. The Nodal displacements are u1 = 0.05 mm and w1 = 0.03 mm; u2 = 0.02 mm and w2 = 0.02 mm; u3 = w3 = 0. (16)

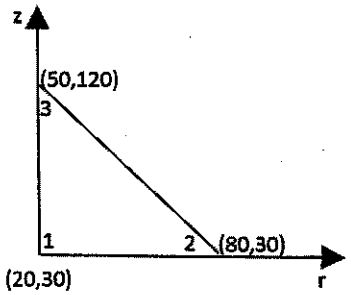

Figure.5.

15. a) i) Explain in detail about the process of finite element method. (10)

ii) Write the advantages and limitations of finite element method. (6)

(OR)

b) Explain briefly about FEM software and its practical applications. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE203 – Highway and Railway Engineering

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define carriage way.
2. What are Shoulders?
3. Define obligatory point.
4. Classify the types of sight distance.
5. Write are the requirements of an ideal pavement.
6. Mention the desirable properties of bituminous mix.
7. Define Permanent way.
8. Mention the need of super elevation.
9. Define Crossings.
10. When level crossing are adopted.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	i)	Discuss the various classifications of Indian Roads.	(8)
		ii)	Write a short note on Indian Road Congress.	(8)
			(OR)	
	b)	i)	Describe about Jayakar Committee Recommendations.	(8)
		ii)	Write short notes on camber and footpaths.	(8)
12.	a)	i)	Enumerate the factors affecting geometric design.	(8)
		ii)	Explain OSD and SSD.	(8)
			(OR)	
	b)	i)	Describe about Super-elevation.	(8)
		ii)	Discuss about design of hilly roads.	(8)
13.	a)	i)	Discuss the viscosity test, softening test and softening tests for bitumen with neat sketches.	(8)
		ii)	List the various types of defects in flexible pavement.	(8)

(OR)

b) i) Explain the construction practice water bound macadam road with neat sketch. (8)

ii) Enumerate the failures in rigid pavements. (8)

14. a) Enumerate the types of rail joints, rail fixtures and fastening used in a track. (16)

(OR)

b) Design and draw a neat sketch of permanent way cross section and explain the functions of its components. (16)

15. a) i) Explain the types of signaling with neat sketches. (8)

ii) Write briefly about maintenance of railway trade. (8)

(OR)

b) i) Design and draw a neat sketch of marshaling yard. (8)

ii) Explain with neat sketch, the laying of railway track. (8)

Government College of Engineering :: Salem

(An Autonomous Institution Affiliated to Anna University, Chennai)

B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME203 – Manufacturing Technology - II

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State any two principal methods of gear manufacturing.
2. List any two methods of gear finishing.
3. Define Casting.
4. Name any two merits of shell moulding.
5. List any three products that can be manufactured using advanced forming processes.
6. State the importance of the forming process.
7. List any four applications of water jet machining.
8. What are the properties required for a dielectric fluid used in EDM?
9. State the need for rapid prototyping.
10. What are the materials used in stereo lithography process?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the principle of gear hobbing operation. What are the advantages and disadvantages of gear hobbing process? (16)

(OR)

b) Why machined gears are usually subjected to finishing operations? Which of the finishing processes are not suitable for hardened gear teeth? Justify. (16)

12. a) i) Explain squeeze casting process with a neat sketch. (8)

ii) Distinguish between conventional casting and modern casting methods. (8)

(OR)

b) Explain the principle and operation of CO_2 moulding. State the merits and demerits over other types. (16)

13. a) i) With the aid of a neat sketch, explain electromagnetic forming process. (8)

ii) State and explain the various process variables related to the electromagnetic forming. (8)

(OR)

b) Explain the following forming process with a neat sketch: (16)

i) Explosive forming

ii) Water hammer forming.

14. a) Describe the process of EDM, its process parameters, advantages, disadvantages, and applications. (16)

(OR)

b) With a schematic layout of Abrasive Jet Machine and explain its operational characteristics. What are the methods adopted to have an effective control over the mass flow rate of the abrasive? (16)

15. a) i) Describe the working principle of Stereo lithography system. (8)

ii) List and explain the major steps followed in rapid prototyping process. (8)

(OR)

b) i) Explain the working principle of a FDM machine with a suitable sketch. (8)

ii) Distinguish the following process: FDM and SGC. (8)

Government College of Engineering :: Salem

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B.E. Degree Examinations – April/May 2022

I & II Semester (Full Time)

(2018 Regulations)

COMMON TO ALL BRANCHES

18ME101 – Engineering Graphics and Design

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Draw the projection of a point P 50 mm behind VP and 30 mm below HP.
2. What is orthographic projection?
3. A line PQ, 60 mm long is perpendicular to the HP and 15 mm in front of the VP. The end P, nearer to the HP is 20 mm above it. Draw the projections of the line.
4. Why cylinder is called as solid of revolution?
5. Differentiate prism and pyramid.
6. How the frustum of cone is produced?
7. Write the applications of development of surfaces.
8. Describe the construction of Isometric scale.
9. What is station point?
10. Compare visual ray method with vanishing point method.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) The end P of a line PQ, 70 mm long is 15 mm above the HP and 20 mm in front of the VP. Q is 40 mm above the HP. Its top view is inclined at 45° to the VP. Draw the projections of the line and find its true inclinations with the VP and the HP. (16)

(OR)

b) A pentagon of side 30 mm rests on the ground on one of its sides inclined at 30° to the VP. The surface of the pentagon makes an angle of 50° with the ground. Draw the top and front views of the pentagon. (16)

12. a) Draw the projections of a cone of base diameter 60 mm and axis length 80 mm when it lies on the ground on one of its generators with the axis parallel to the VP. (16)

(OR)

b) Draw the projections of a pentagonal prism of base side 30 mm and axis length 60 mm when it is lying on the ground on one of its rectangular faces and the axis is inclined at 30° to the VP. (16)

13. a) A pentagonal prism of base side 20 mm and height 40 mm rests on the HP on one end with one of its rectangular faces parallel to the VP. It is cut by a plane perpendicular to the HP and inclined at 60° to the VP at a distance of 5 mm from the axis. Draw the top view, sectional front view and the true shape of the section. (16)

(OR)

b) A hexagonal pyramid of base of side 25 mm and altitude 50 mm is resting vertically on its base on the ground with two of the sides of the base perpendicular to the VP. It is cut by a plane perpendicular to the VP and inclined at 40° to the HP. The plane bisects the axis of the pyramid. Draw the development of the lateral surfaces of the pyramid. (16)

14. a) Draw the isometric view of a cylinder of diameter 46mm and height 60mm when it is resting on one of its ends on the HP. It is cut by a plane perpendicular to the VP and inclined at 45° to the HP. The plane passes through a point on the axis located at 15 mm from the top. (16)

(OR)

b) Draw the isometric view of a frustum of a hexagonal pyramid when it is resting on its base on the HP with two sides of the base parallel to the VP. The side of base is 20 mm and top 8 mm. The height of the frustum is 55 mm. (16)

15. a) A cube of side 50 mm rests on the ground on the base with all the vertical faces equally inclined to picture plane. One vertical edge is touching the picture plane and is 15 mm to the left of the station point which is 70 mm above the ground and 55 mm in front of the picture plane. Draw the perspective of the cube. (16)

(OR)

b) A hexagonal prism of base side 20 mm and height 40 mm stands on its base on the ground with a base side parallel to the PP and 15 mm behind the PP. The observer's eye is 75 mm above the ground and 60 mm in front of the PP. The eye is located at 40 mm to the right of the axis of the prism. Draw the perspective view of the prism. (16)

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B.E. Degree Examinations – April/May 2022

I Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME103 – Manufacturing Technology - I

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List the difference between orthogonal cutting and oblique cutting.
2. Why is lubrication not required while machining cast iron?
3. Differentiate live centre and dead centre.
4. Mention the need of automatic lathes.
5. What are the differences between drilling and reaming?
6. List out the various elements of a plain milling cutter with a neat sketch.
7. Give the specifications of a grinding machine.
8. List some of the materials of broaching tools.
9. Compare a closed loop NC system with open loop NC system.
10. Write down the types of statements in APT language.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain various classifications of machine tools. (8)

ii) Describe the mechanism of metal cutting. (8)

(OR)

b) i) Discuss the requirements and properties of a tool material. (8)

ii) Mention the functions of cutting fluids and give few examples. (8)

12. a) i) List the various operations that can be performed on a lathe. (3)

ii) Explain about various types of taper turning methods with neat sketches. (13)

(OR)

b) i) Write down the difference between a capstan and a turret lathe. (3)

ii) Discuss about the main parts of a turret lathe with neat sketch. (13)

13. a) i) Discuss the various operations performed in drilling machines. (8)

ii) Sketch and describe the basic types of milling cutter. (8)

(OR)

b) i) Describe the horizontal knee type milling machine with a suitable sketch. (8)

ii) With a neat sketch, describe the working principle of a jig boring machine. (8)

14. a) i) Briefly discuss about the different types of abrasives used in a grinding wheel. (8)

ii) Explain the working mechanism of cylindrical grinding. (8)

(OR)

b) i) Classify broaching machines and explain any one type with a neat sketch. (8)

ii) Make a comparison between the types of sawing machine. (8)

15. a) i) Narrate the design considerations of CNC machines, which are essential for proper functioning. (8)

ii) List any five motion control statements of computer assisted NC programming and explain. (8)

(OR)

b) i) Explain the various statements in APT with an example. (8)

ii) List the difference between manual and computer assisted part programming. (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE202 – Strength of Materials

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State Castiglione's second theorem.
2. Define determinate beams.
3. State theorem of three moments.
4. Illustrate propped cantilever beams.
5. Define short columns.
6. Define slenderness ness ratio.
7. Define shear center.
8. Illustrate unsymmetrical bending.
9. What do you meant by thick cylinders?
10. Mention the different theories.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Derive the equation for the slope and deflection of a simply supported beam of length L carrying a point load W at the center by any method. (16)

(OR)

b) A beam simply supported over a span of 3 m carries a uniformly distributed load of 20 kN/m over the entire span. Taking EI = 2.25 MNm^2 and using Castigliano's theorem determine the deflection at the center of the beam (unit load method). (16)

12. a) Draw the shear force and bending moment diagram for a simply supported beam of length 9 m and carrying a uniformly distributed load of 10 kN/m for a distance of 6 m from the left end. (16)

(OR)

b) Analyze a continuous beam by using Clapeyron theorem (16)
$E = 200 \times 10^6$ kN/m^2 $I = 8 \times 10^{+4}$ mm^4.

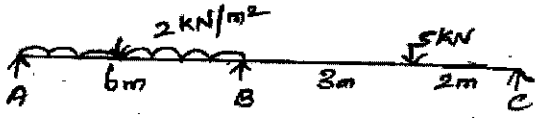

Figure.1.

13. a) Compare the ratio of the bulking strengths of two columns of circular section one with hollow and the other with solid, when both are made of the same material, having the same length, same area and same end conditions. The internal diameter is half of the external diameter. (16)

(OR)

b) Derive an expression for Euler's crippling load, when one end of the column is fixed and other end is hinged. (16)

14. a) A 40 mm x 40 mm x 5 mm angle is used as a simply supported beam over a span of 2.4 meters. It carries a load of 200 N along the vertical axis passing through the centroid of the section. Determine the resulting bending stresses on the outer corners of the section, along the middle section of the beam. (16)

(OR)

b) A beam of T-section (flange : 100 mm x 20mm: web: 150 mm x 10mm) is 2.5 meters in length and is simply supported at the ends. It carries a load of 3.2 kN inclined at 20° to the vertical and passing through the centroid of the section. If E = 20 GN/m^2, calculate: (16)

i) Maximum tensile stress
ii) Maximum compressive stress
iii) Deflection due to the load
iv) Position of the neutral axis.

15. a) A thick cylinder of internal diameter 10 cm, external diameter 20 cm, is subjected to an internal pressure of 100 kg/cm^2. Sketch the distribution of radial pressure and hoop stress in the wall of the cylinder. Also calculate the radial pressure and hoop stress. (16)

(OR)

b) Describe Maximum principal stress theory and Maximum strain energy theory. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

16PTEC203 – Linear Integrated Circuits

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State the ideal characteristics of an op-amp.
2. Define input offset voltage of an op-amp.
3. Draw the log amplifier using op-amp.
4. Write down few applications of Schmitt trigger.
5. What is the need for LPF in PLL?
6. Design a monostable multivibrator using 555 timer for T_{ON} = 12 sec. Assume C = 1 μF.
7. What is meant by resolution of DAC?
8. Give the demerits of weighted resistor DAC.
9. What are the disadvantages of linear voltage regulators?
10. List down the features of LM380 Audio power amplifier.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive the expression for the output current for a Widlar current source. (8)

    ii) How to improve the CMRR of a differential amplifier and discuss the circuit in detail. (8)

    (OR)

    b) Elaborate on the different frequency compensation techniques applied to an op-amp. (16)

12. a) i) Draw and explain about voltage to current converter. (8)

    ii) Explain the working of an instrumentation amplifier. (8)

    (OR)

    b) i) Draw the circuit of practical integrator. Explain its operation and derive the expression for its output voltage. (8)

    ii) Explain the operation of triangular wave generator with neat sketches. (8)

13. a) i) Explain the 555 timer in astable mode and derive the expression for its frequency of oscillation. (10)

ii) Write short notes on digital phase detector. (6)

(OR)

b) i) Explain the working of Voltage Controlled Oscillator. How does it differ from an ordinary oscillator? (10)

ii) Explain the application of PLL as frequency multiplier. (6)

14. a) i) Discuss the function of successive approximation ADC. (8)

ii) Explain about high-speed sample and hold circuit. (8)

(OR)

b) i) Discuss the working of R-2R ladder type DAC. (8)

ii) What is delta sigma modulation? Explain the A/D conversion using delta modulator. (8)

15. a) i) Explain the function of frequency to voltage converter. (6)

ii) Explain in detail about LM380 monolithic power amplifier. (10)

(OR)

b) i) Write short notes on switched capacitor filter. (6)

ii) With neat sketches, explain the function of IC723 low voltage regulator. (10)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE203 – Control System

(Semi log sheet, polar graph sheet, and Ordinary graph sheet to be supplied)

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Distinguish between open loop and closed loop systems.
2. Mention the difference between a Synchros transmitter and a synchros control transformer.
3. Give the formulae for static error coefficients.
4. What are Poles and Zeros?
5. Define Gain margin and Phase margin.
6. What are the advantages of Nichol's chart?
7. State the principle of Argument.
8. Give the necessary conditions for stability of control system.
9. Compare lead compensator with lag compensator.
10. What is the need for compensation?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) State and explain important block diagram reduction rules with examples. (10)

ii) Compare AC and DC servomotors. (6)

(OR)

b) i) Convert the block diagram shown to signal flow graph and find the transfer function $\frac{Y(S)}{R(S)}$. (10)

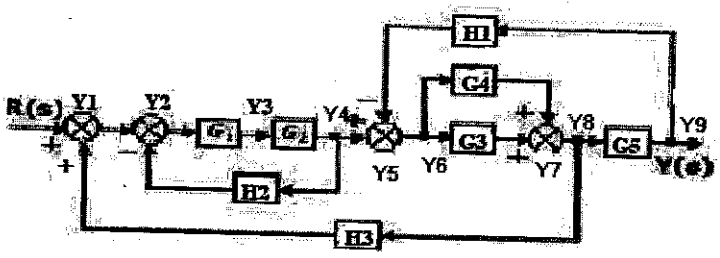

Figure.1.

ii) Discuss on the basic elements in control system. (6)

12. a) i) Explain the effect of adding P and PI controllers in feedback control systems with necessary expressions. (8)

ii) Derive the step response of first order system. (8)

(OR)

b) i) Discuss on standard test signals. (8)

ii) The open loop transfer function of a servo system with unity feedback is $(s) = \frac{10}{s(0.1s+1))}$. Evaluate the static error constants of the system when subjected to an input given by the polynomial $r(t) = a_0 + a_1t + (a_2/2)t^2$. (8)

13. a) Construct a BODE plot for the following transfer function and obtain gain and phase cross over frequencies. $G(s) = \frac{10}{s(1+0.4s)(1+0.1s)}$. (16)

(OR)

b) Draw the polar plot for the function $G(s) = \frac{10}{s(s+1)(s+2)}$. Determine the gain margin. (16)

14. a) Construct a root locus of the system whose open loop transfer function $G(s) = \frac{K}{s(s+2)(s+4)}$. Determine the value of K so that the damping ratio of the closed loop system is 0.5. (16)

(OR)

b) Determine the stability of the system represented by the characteristic equation $s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$ and comment on the location of the roots. (16)

15. a) Explain the realization of basic compensators – Lag and Lag - Lead. (16)

(OR)

b) Discuss the procedure for designing a lead compensator using BODE Plot. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME202 – Engineering Materials and Metallurgy

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Distinguish between primary bond from secondary bonds.
2. Draw a graph for weak and strong bond with respect to potential energy and inter atomic distance.
3. Give advantages of heat treatment process.
4. Distinguish between cyaniding and carbo nitriding process.
5. Mention the properties of ceramic materials.
6. List the applications of ceramic materials.
7. Compare strength and hardness of a material.
8. How creep testing can be carried out?
9. List any four application of surface engineering.
10. Mention any four industrial uses of non-destructive testing process.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain any one phase diagram with changes with respect to temperature and percentage of carbon. (16)

(OR)

b) Describe Miller Indices with Law of rational and also discuss any one BCC with diagram. (16)

12. a) Briefly explain the process of normalizing, hardening and tempering with applications. (16)

(OR)

b) Describe the flame and induction hardening process with a neat sketch. (16)

13. a) Describe the ceramic coating methods with a neat sketch. (16)

(OR)

b) Explain the application of fiber and particulate reinforced composite. (16)

14. a) i) Describe the fatigue process with diagram. Also, explain the factors affecting fatigue life. (10)

ii) Write short notes on plasma deformation process. (6)

(OR)

b) Discuss the compression test process and Brinell hardness test with work preparation procedure with schematic representations. (16)

15. a) Explain the procedure of magnetic particle inspection and liquid penetrant inspection method with a neat diagram. (16)

(OR)

b) Discuss the concept, procedure and applications of high and low energy beam method with a neat diagram. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING & MECHANICAL ENGINEERING

18CS101 – Fundamentals of Problem Solving and C Programming

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List out the characteristics of an algorithm.
2. Mention the need for Logical Analysis and thinking.
3. Show the difference between while and do-while.
4. List out the rules for naming a variable in C.
5. What are Preprocessor directives? Mention its types.
6. What are the different ways of initializing an array?
7. What is meant by library function?
8. Develop a C program to illustrate no argument and no return value in a function.
9. Write the difference between structures and array.
10. Illustrate how will you access the members of union?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Discuss in detail about various generation of computers. (10)

    ii) Draw a flowchart to find the maximum of three numbers and explain in detail. (6)

(OR)

    b) i) Draw the block diagram to illustrate the basic organization of computer system and explain the functions of the various units. (10)

    ii) Write the pseudo code for finding the sum of numbers from 1 to N. (6)

12. a) Explain in detail about various operators in C language. (16)

(OR)

    b) Describe in detail about looping and branching statements in C language with examples. (16)

13. a) i) Write a C program to add two matrices and display the resultant matrix. (8)

    ii) Write a C program to sort the given n numbers in ascending order. (8)

(OR)

b) i) Write a C Program to check whether the given element is present in the array. (8)

ii) Briefly Explain various string handling functions in C with example. (8)

14. a) i) Assess in detail about various pointer arithmetic operations. (10)

ii) Discuss in detail about the use of pointers with suitable example. (6)

(OR)

b) i) What is meant by function in C? Discuss about call by value and call by reference with illustrations. (10)

ii) What is meant by recursion explain with an example. (6)

15. a) Write a C program using structure to prepare the students mark statement. (16)

(OR)

b) Explain in detail about various File operations with suitable example. (16)

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B.E. Degree Examinations – April/May 2022

I Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME102 – Fluid Mechanics and Machinery

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Differentiate compressible and incompressible fluids. Give suitable examples.
2. Distinguish between gauge pressure, absolute pressure and vacuum pressure.
3. What are the assumptions of the Bernoulli's equations?
4. State the advantages of Dimensional and model analysis.
5. Write down the causes of minor energy losses in flow through pipes.
6. What is meant by boundary layer separations?
7. Give an example for a low head turbine, a medium head turbine and a high head turbine.
8. Draw the velocity triangle diagram for Pelton Wheel turbine.
9. List the functions of an air vessel.
10. What is meant by NPSH?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) In a vertical pipe conveying oil of specific gravity 0.9, two pressure gauges have been installed at A and B where the diameters are 20 cm and 10 cm respectively. A is 2 meters above B. The pressure gauge reading at B is greater than at A by 0.981 N/cm^2. Neglecting all losses, calculate the flow rate. If the gauges at A and B are replaced by tubes filled with the same liquid and connected to a U-tube containing mercury, calculate the difference of level of mercury in the two limbs of the U-tube. (16)

(OR)

b) i) Define and distinguish between the following set of fluid properties : (12)

i) Specific weight and mass density

ii) Cohesion and adhesion

iii) Surface tension and capillarity, and

iv) Dynamic viscosity and kinematic viscosity.

ii) A plate 0.025 mm distant from a fixed plate, moves at 60 cm/s and requires a force of 2 N/m^2 to maintain this speed. Determine the fluid viscosity between the plates. (4)

12. a) A 30 cm x 15 cm venturimeter is provided in a vertical pipe line carrying oil of specific gravity 0.9, the flow being upwards. The difference in elevation of the throat section and entrance section of the venture meter is 30cm. The differential U-tube mercury manometer shows a gauge deflection of 25 cm. Calculate: i) the discharge of oil. ii) The pressure difference between the entrance section and the throat section. Take co-efficient of discharge as 0.98 and specific gravity of mercury as 13.6. (16)

(OR)

b) Derive on the basis of dimensional analysis suitable parameters to present the thrust developed by a propeller. Assume that the thrust P depends upon the angular velocity ω, speed of advance V, diameter D, dynamic viscosity μ, mass density ρ, elasticity of the fluid medium which can be denoted by the speed of sound in the medium C. (16)

13. a) Three pipes of diameters 400 mm, 300 mm and 500 mm and lengths 450 m, 255 m and 315 m respectively are connected in series. The difference in water surface levels in two tanks is 18 m. Determine the rate of flow of water if coefficients of friction are 0.0075, 0.0078 and 0.0072 respectively considering: i) Minor losses also and ii) Neglecting minor losses. (16)

(OR)

b) The velocity distribution in the boundary layer is given by (16)

$$\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$$

Where and being boundary layer thickness. Determine,

i) Displacement thickness,

ii) Momentum thickness and

iii) Energy thickness.

14. a) i) Derive the expression for hydraulic efficiency of Pelton wheel. (10)

ii) Discuss the efficiency and performance curves of Pelton wheel. (6)

(OR)

b) A hub diameter of a Kaplan turbine, working under a head of 12 m, is 0.35 times the diameter of the runner. The turbine is running at 100 rpm. If the vane angle of the runner at outlet is 15° and flow ratio 0.6, Find, (16)

i) Diameter of the runner,

ii) Diameter of the boss, and

iii) Discharge through the runner. Take the velocity of whirl at outlet as zero.

15. a) i) Sketch a double acting reciprocating pump and derive the expression for work done of it. (8)

ii) Explain about the working principle of centrifugal pump with neat sketch. (8)

(OR)

b) i) Discuss the efficiency and performance curves of centrifugal pump. (8)

ii) Explain the working principle of gear pump with neat sketch. (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE201 – Basic Structural Steel Design

(Use of IS800 – 2007 & Steel tables are permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. List down different loads acting on structures.
2. Define Fatigue.
3. Mention the assumptions made in the design of bolted connection.
4. Draw the need sketch of Fillet weld and butt weld.
5. What are the modes of failure of tension members?
6. Write down the function of Lug angle in connection.
7. Differentiate between strut and column.
8. When built-up columns are preferred?
9. What do you mean by plastic section modulus?
10. Draw neat sketch of web buckling and web crippling.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Enumerate the classification of structures based on function, material and shape. (8)

ii) Discuss about Limit State method of Design. (8)

(OR)

b) i) Discuss the advantages of steel structures. (8)

ii) Explain why Limit State method of design is adopted for design now days. (8)

12. a) Calculate the strength of a 20 mm diameter bolt of grade 4.6 for the following cases a) Lap joint b) Single cover butt joint with cover plate 10 mm thick c) Double cover butt joint with cover plate 8 mm thick. The main plates to be joined are 12 mm thick. Based on the result discuss the advantages of one case over the other. (16)

(OR)

b) i) The 25 mm x 150 mm plate is connected to a 25 mm x 250 mm plate with longitudinal fillet welds to transfer a tensile load. Given: L = 200 mm; F_y = 345 MPa; F_u = 448 MPa. Determine the design tensile strength of the plate. (8)

ii) Discuss in detail about failure of welded connection. (8)

13. a) Design a single angle tension member to carry an axial factored tensile force of 150 kN. Design the member using Fe410 grade steel and bolts of grade 4.6. (16)

(OR)

b) Design a single angle tension member to carry an axial tensile force of 200 kN. Design the connection using weld. (16)

14. a) Design a compression member to carry an axial load of 500 kN. The unsupported length of the column is 6 m and ends are restrained against translation. (16)

(OR)

b) An ISHB 350 @ 710.2 N/m column has to carries a factored load of 2000 kN. Design a welded gusseted base plate. The design bearing strength of concrete is 9 N/mm^2 at an eccentricity. (16)

15. a) Classify the following sections, where f_y = 250 MPa : (16)

i) ISLB 300 @ 37.7 kg/m

ii) ISHB 400 @ 77.4 kg/m

iii) ISHB 200 @ 37.3 kg/m

iv) ISA 100 x100 x 6 @ 9.2 kg/m.

(OR)

b) Design a simply supported beam of span 3 meters. The beam is subjected to a factored bending moment of 250 kNm and a factored shear force of 120 kN. The beam is laterally unsupported. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

16PTEC202 – Electronic Circuits - I

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Determine the values of I_C and I_B for the transistor circuit if I_E = 12mA and β = 100.
2. Define Thermal runaway.
3. State Miller's theorem.
4. List the features of Darlington Circuit.
5. Define Gain bandwidth product.
6. What is the need of Multistage Amplifiers?
7. Justify the validity of approximate hybrid model applicable in low frequency region.
8. Why heat sink is required?
9. In class B amplifier V_{CE} (min) = 1.5V and supply voltage V_{CC} = 12V, find the collector circuit efficiency.
10. List out advantages of SMPS.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Draw a voltage divider bias circuit and derive an expression for its stability factor. (12)

    ii) In a fixed bias method a silicon transistor with β = 100 is used, V_{CC} = 6V, R_C = 3 K ohms, R_B = 530 K ohms. Draw the d.c load line and determine the operating point. (4)

(OR)

    b) i) Draw and describe two biasing circuit for a JFET. (12)

    ii) Explain how a FET is used as a voltage variable resistor. (4)

12. a) Draw the ac equivalent circuit of a CB amplifier using h-parameter model and derive the equations for voltage gain, Current gain, input impedance and output impedance. (16)

(OR)

b) Draw the small signal equivalent circuit of FET amplifier in CS configuration and derive the equations for voltage gain current gain, Input impedance and output admittance. (16)

13. a) Discuss the effect of Emitter bypass capacitor on low frequency response of BJT amplifiers. (16)

(OR)

b) Draw the high frequency π model of a transistor and explain it. (16)

14. a) i) Draw the circuit diagram of a push pull Amplifier and explain its working. (10)

ii) Derive the equations for efficiency of complementary symmetry push pull amplifier. (6)

(OR)

b) Explain in detail about Class C & D Power Amplifiers. (16)

15. a) Explain the working of a full wave rectifier and give waveforms of input and output voltage, Derive the expression for ripple factor, form factor, peak factor of a full wave rectifier with resistive load. (16)

(OR)

b) Explain the various types of filter used in power supplies. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE202 – Synchronous and Induction Machines

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define voltage regulation of an alternator.
2. List the conditions for parallel operation of alternator.
3. Why a synchronous motor is called as constant speed motor?
4. How will you minimize the hunting of synchronous motor?
5. State the condition of maximum torque developed by three phase induction motor.
6. A 4 – Pole, 3 Phase, 50 Hz star connected induction motor has a full load slip of 4%. Calculate full load speed of the motor.
7. Why the starters are necessary for three phase induction motor?
8. List out the methods of speed control of three phase induction motor from its rotor side.
9. What are the tests necessary to draw the equivalent circuit of single phase induction motor?
10. List out any four applications of repulsion motor.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the synchronous impedance method of determining regulation of synchronous generator. (8)

ii) A three phase 16 pole alternator has star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.04 Wb and is distributed sinusoidally. The speed is 375 rpm. Find the frequency, phase emf and line emf. The coil span is 120 degrees electrical. (8)

(OR)

b) i) Discuss the Blondel's two reaction theory for the synchronous machine. (8)

ii) Describe how the direct and quadrature-axis reactance of a salient-pole synchronous machine can be estimated by means of slip test. (8)

12. a) i) How V curves and Inverted V-curves of a synchronous motor can be obtained? (8)

ii) Explain the various methods of starting synchronous motor. (8)

(OR)

b) i) A three phase 11000 V, star connected synchronous motor takes a load of 100 A. The effective synchronous reactance and resistance per phase are 30 Ω and 0.8 Ω respectively. Find the power supplied to the motor and the induced emf for 0.8 power factor lagging. (8)

ii) Derive an expression for the power developed per phase of a synchronous motor. (8)

13. a) i) Describe the production of rotating magnetic field in a 3-ϕ induction motor. (8)

ii) Derive the expression for the ratio of full load torque to maximum torque. (8)

(OR)

b) i) Write brief note on 'induction generators'. (8)

ii) Derive the relationship between rotor input power (P_2), rotor copper losses (P_c) and Gross mechanical power (Pm). (8)

14. a) i) Explain the speed control of induction motor on rotor side. (8)

ii) Explain the operation of rotor resistance starter for slip ring induction motor? (8)

(OR)

b) i) Explain the static Scherbius system of slip power recovery scheme. (8)

ii) Determine approximately the starting torque of an induction motor in terms of full-load torque when started by (8)

1. Star-delta starter
2. Auto-transformer starter with 50 % tapping. Starting current of motor at normal voltage is 5 times the full load current and slip at full load torque is 4%.

15. a) i) Explain the operation of single phase induction motor using double field revolving theory. (8)

ii) Discuss the different methods of starting the single phase induction motor. (8)

(OR)

b) i) Describe the construction and principle of operation of hysteresis motor. (8)

ii) Draw the equivalent circuit of single phase induction motor and discuss the experimental procedure to obtain its parameters. (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME201 – Thermal Engineering

(Use of thermodynamic tables, Mollier diagram, Psychrometric chart and Refrigerant property tables to be Permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Dual cycle is combination of otto and Diesel cycle. Justify.
2. Construct the theoretical PV diagram of two stroke engine.
3. Classify I.C engines.
4. List the pollutants of product of combustion.
5. Define the term dryness traction.
6. List the functions of governors.
7. Define isentropic efficiency of reciprocating air compressor.
8. Compare Centrifugal and axial flow compressor.
9. Identify important refrigeration application.
10. What is GSHF?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) An engine working on Otto cycle has a volume of 0.45 m^3, pressure 1 bar and temperature 30°C at the beginning of compression stroke. At the end of compression stroke, the pressure is 11 bar. 210 k J of heat is added at constant volume. Find: (12)
    1. Pressures, temperatures and volumes at salient points in the cycle
    2. Percentage clearance
    3. Efficiency
    4. Mean effective pressure
    5. Ideal power developed by the engine if the number working cycles per minute is 210. Assume the cycle is reversible.

    ii) Construct and explain the PV diagram of dual cycle. (4)

(OR)

b) i) Consider an air standard cycle in which the air enters the compressor at 1.0 bar and 20°C. The pressure of air leaving the compressor is 3.5 bar and the temperature at turbine inlet is 600°C. Find per kg of air: (12)

1. Efficiency of the cycle
2. Heat supplied to air
3. Work available at the shaft
4. Heat rejected in the cooler
5. Temperature of air leaving the turbine. For air $\gamma = 1.4$ and $C_p = 1.005$ k J/kg K.

ii) Differentiate actual and theoretical p-v diagram of four stroke engine. (4)

12. a) i) Explain with suitable sketches the working of a four stroke otto engine. (10)

ii) Compare two stroke and four stroke engines. (6)

(OR)

b) i) Illustrate the following methods of cooling in I.C engines. (10)

1. Air cooling
2. Liquid cooling. Also list their relative advantages and disadvantages.

ii) Identify the difference between i) pre-ignition, ii) auto – ignition and detonation. (6)

13. a) i) Dry saturated steam at a pressure of 11 bar enters a convergent-divergent nozzle and leaves at a pressure of 2 bar. If the flow is adiabatic and frictionless, solve: (12)

1. The exit velocity of steam
2. Ratio of cross -section at exit and that at throat. Assume the index of adiabatic expansion to be 1.135.

ii) Tell about supersaturated flow. (4)

(OR)

b) i) In an impulse turbine (with a single row wheel) the mean diameter of the blades is 1.05 m and the speed is 3000 r.p.m. The nozzle angle is 18°, the ratio of blade speed to steam speed is 0.42 and the ratio of the relative velocity at outlet from the blades to that at inlet is 0.84. The outlet angle of blade is to be made 3° less than the inlet angle. The steam flow is 10 kg/s. Construct the velocity diagram for the blades and derive the following: (12)

1. Tangential thrust on the blades
2. Axial thrust on the blades
3. Resultant thrust on the blades
4. Power developed in the blades
5. Blading efficiency.

ii) Discuss about compounding. (4)

14. a) i) A single -stage single -acting air compressor delivers 0.6 kg of air per minute at 6 bar. The temperature and pressure at the end of suction stroke are 30°C and 1 bar. The bore and stroke of the compressor are 100 mm and 150 mm respectively. The clearance is 3% of the swept volume. Assuming the index of compression and expansion to be 1.3, estimate: (12)

1. Volumetric efficiency of the compressor
2. Power required if the mechanical efficiency is 85%, and Speed of the compressor (r.p.m).

ii) List the differences between Reciprocating and Rotary air compressor. (4)

(OR)

b) i) Analyze the working of a multi stage air compressor and also classify the intercooling with PV diagram. (12)

ii) Explain briefly a Vane blower compressor. (4)

15. a) i) A simple vapour compression plant produces 5 tonnes of refrigeration. The enthalpy values at inlet to compressor, at exit from the compressor, and at exit from the condenser are 183.19, 209.41 and 74.59 k J/kg respectively. Estimate: (8)

1. The refrigerant flow rate
2. The C.O.P.,
3. The power required to drive the compressor
4. The rate of heat rejection to the condenser.

ii) Compare vapour compression refrigeration and vapour absorption refrigeration system. (8)

(OR)

b) i) Explain with neat diagram the working of central system of air conditioning. (8)

ii) Explain about cooling load calculations. (8)

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I Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTMA101 – Mathematics - I

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Find the Particular integral of $(D^2+4D+4)y=e^{-2x}$.
2. Transform the equation $(2x-1)^2y''-4(2x-1)y'+8y=8x$ in to the linear differential equation with constant coefficient.
3. Form the P.D.E. by eliminating arbitrary constants 'a' and 'b' from z = ax + by + ab.
4. Solve : $(D^2-DD')z=0$.
5. Find the gradient of $\emptyset = x^2+y^3+z^4$ at the point (1, -1, 1).
6. Show that the vector $\vec{F}=(x+2y)\vec{i}+(y+3z)\vec{j}+(x-2z)\vec{k}$ is Solenoidal.
7. Verify whether $w=\bar{z}$ is analytic or not.
8. Find the fixed point of the transformation $w=\frac{z+1}{2z+1}$.
9. State Cauchy's Integral theorem.
10. Evaluate $\int_c \frac{dz}{(z-3)^2}$ where 'c ' is the circle $|z|=1$.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Solve : $(D-1)^2y=\sin h2x+x$. (8)

ii) Solve : $x^2y''+3xy'+5y=x\cos(logx)$. (8)

(OR)

b) i) Solve : $(D^2-2D+4)y=e^x\cos x+5$. (8)

ii) Solve : $\frac{d^2y}{dx^2}+4y=\tan 2x$ by using the method of variation of parameter. (8)

12. a) i) Solve : $x(y-z)p+y(z-x)q=z(x-y)$. (8)

ii) Solve : $(D^2-5DD'+6D'^2)z=\sin(x-y)$. (8)

(OR)

b) i) Form the partial differential equation by eliminating the arbitrary function from $z = f(x + ay) + g(x - ay)$. (8)

ii) Solve : $(D^2 - 2DD' - D'^2)\, z = x^2 y + e^{x-y}$. (8)

13. a) i) Find the directional derivative of $\varphi = xy + yz + zx$ at the point (1, 2, 0) in the direction of $\vec{i} + 2\vec{j} + 2\vec{k}$. (8)

ii) Deduct $\int_c \vec{F}.\vec{dr}$ where $\vec{F} = (2y + 3)\vec{i} + (xz)\vec{j} + (yz - x)\vec{k}$ along the line joining the points (0, 0, 0) to (2, 1, 1). (8)

(OR)

b) Verify Gauss divergence theorem, over the rectangular parallelepiped which bounded by $x = 0$, $x = 2$, $y = 0$, $y = 1$, $z = 0$ and $z = 3$ where $\vec{F} = 2xy\vec{i} + yx^2\,\vec{j} + xz\,\vec{k}$. (16)

14. a) i) Prove that an analytic function with constant real part is constant. (8)

ii) Construct the analytic function f(z), whose imaginary part is $v = e^x(x\cos y - y\sin y)$. (8)

(OR)

b) i) Obtain the image of $|z - 2i| = 2$, under the transformation $w = 1/z$. (8)

ii) Find the bilinear transformation which maps the points $z = 1, i, -1$ on to the points $w = 0, 1, \infty$. (8)

15. a) i) By using Cauchy's integral formula, (8)
Evaluate $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)}\, dz$, where 'c' is $|z|=3$.

ii) Determine the Residues for the function $f(z) = \frac{z+1}{z\,(z-1)\,(z-2)^2}$ (8)

(OR)

b) i) Find the Laurent's series expansion of the function (8)
$f(z) = \frac{z-1}{(z+2)(z+3)}$ valid in the region $2 < |z| < 3$.

ii) Evaluate $\int_{-\infty}^{\infty} \frac{dx}{(x^2+4)^2}$ by using contour integration. (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18CM201 – Basic Civil and Mechanical Engineering

Time : 3 Hours

Maximum Marks : 100

Part - I

(4 x 2 = 8 Marks)

Basic Civil Engineering

Part A

Answer ALL Questions

1. Define stress and strain.
2. How bricks are classified?
3. Distinguish between the brick masonry and stone masonry.
4. What is the purpose of plastering?

Part B

(2 x 16 = 32 Marks)

Answer ALL Questions

5. a) i) With the help of a flow diagram explain the main operations involved in the manufacture of ordinary Portland cement. (8)

ii) The following perpendicular offsets were taken at 10 m intervals from a survey line to an irregular boundary line: 3.15 m, 4.30 m, 8.20 m, 6.85 m, 7.60 m, 4.20 m, 5.60 m, and 4.30 m. Calculate the area enclosed between the survey line, irregular boundary line, first and last offsets by trapezoidal rule. (8)

(OR)

b) i) A steel rod of 20 mm diameter of 1 m long is subjected to an axial pull of 50 KN. Determine the stress, strain and elongation of the rod. Take Young's modulus as $E = 2 \times 10^5 N/mm^2$. (8)

ii) Explain the various steps involved in the manufacture of bricks. (8)

6. a) i) Explain the various types of foundations with neat sketches. (8)

ii) Explain the purpose of lintel and its various types. (8)

(OR)

b) i) Draw the cross-section details of a typical gravity dam and explain its components. (8)

ii) Explain in detail reinforced cement concrete roof. (8)

Part - II (6 x 2 = 12 Marks)

Basic Mechanical Engineering

Part A
Answer ALL Questions

7. Classify the power plants.
8. Write the working principle of centrifugal pumps.
9. What is the function of carburettor?
10. What is the fundamental different between two stroke and four stroke engines?
11. What are factors which affect the comfort air-conditioning?
12. Define COP.

Part B (3 X 16 = 48 Marks)

Answer ALL Questions

13. a) Draw the details of Cochran boiler and mention its advantages. (16)

(OR)

b) Explain the working principle of a single acting reciprocating pump with help of a line sketch, naming all main parts. (16)

14. a) With a neat sketch explain the construction, working principle of four stroke diesel engine. (16)

(OR)

b) Discuss the working of two stroke cycle petrol engine with help of neat sketch. (16)

15. a) Explain with neat sketch of domestic refrigerator. (16)

(OR)

b) Explain the working principle of vapour compression refrigeration system with neat sketch. Compare it with absorption system. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING/MECHANICAL ENGINEERING

18CY101 – Chemistry

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define bond order.
2. Give any two examples of high spin complexes.
3. Which principle is used to explain the sequence of electrons filling in the different orbital?
4. What is a protonic solvent?
5. Draw the chair confirmation of cyclohexane and label different hydrogen.
6. Give an example for electrophile and nucleophile.
7. State the second law of thermodynamics.
8. Define single electrode potential.
9. What is chromophores? Give an example.
10. List out any two applications of IR spectroscopy.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Draw the molecular orbital energy level diagram for CO molecule. (8)

ii) Write note on bond length and bond energies. (8)

(OR)

b) i) What is an aromatic compound? Explain the Huckel rule of aromatic compound with benzene as example. (8)

ii) Define the following with an example High spin and Low spin complexes. (8)

12. a) i) Write note on shielding effect and electron affinity. (8)

ii) Why some elements show diagonal relationship in the periodic table? Explain. (8)

(OR)

b) i) Discuss Bronsted and Lewis concept of acid and bases with two examples each. (8)

ii) What approximations are made in the derivation of Henderson-Hasselbalch equation and slow the derivation of plt of buffer solution. (8)

13. a) i) Write briefly conformation of n-butane. (8)

ii) Write short notes on optical activity. Give two examples of optical active compound. (8)

(OR)

b) i) Write equations to show the actual steps involved in the SN_1 reaction with an example. (8)

ii) Explain Saytzeff rule with an example. (8)

14. a) i) Explain internal energy, enthalpy, entropy and free energy. (8)

ii) Derive Gibbs-Duhem equation. (8)

(OR)

b) i) Derive Nernst equation for single electrode potential. (8)

ii) What is emf series? Mention it's significance. (8)

15. a) State Beer-lambert's law. Explain the essential parts and working of a UV spectrometer. (16)

(OR)

b) Draw neat diagram and explain the principle and instrumentation involved in the working of flame photometer. Explain how sodium is determined by flame photometer? (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18EE101 – Basic Electrical and Electronics Engineering

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State Ohm's law.
2. Compare series and parallel circuits.
3. Define Power factor.
4. Define apparent power and real power.
5. Why transformer rating is related in KVA and not in KW?
6. List the applications of single phase induction motor.
7. Draw the transfer characteristics of CE amplifier.
8. List the applications of zener diode.
9. Mention the purpose of earthing.
10. Draw the block diagram of online UPS.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Solve the following electric network using series parallel analysis. (8)

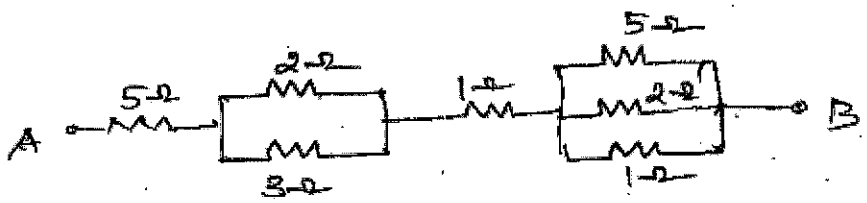

Figure.1.

ii) State and explain Krichoff's laws with examples. (8)

(OR)

b) Solve the following circuit to find the current through 10Ω using Thevenin's theorem. (16)

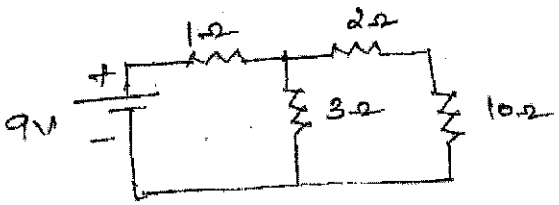

Figure.2.

12. a) i) Define Real power, Reactive power, Apparent power, Power factor, RMS value and Peak value of an AC quantity. (10)

ii) Establish the voltage and current relations in star and delta connections. (6)

(OR)

b) Propose your views on Three phase AC circuits. Also compare single phase circuit with three phase circuit. (16)

13. a) Explain the construction and working of Three phase Induction Motors. (16)

(OR)

b) Explain in detail the working of transformer under no-load and load condition. (16)

14. a) i) Draw and explain V-I Characteristics of Zener diode. (10)

ii) Explain the circuit of inverting amplifier. (6)

(OR)

b) Explain with neat circuit and characteristics the working of common Emitter type NPN transistor. (16)

15. a) Report on the types of house wiring, basics of house wiring tools and components. (16)

(OR)

b) Elaborate on the principle characteristics of batteries, type and its applications. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18EE201 – Principles of Electrical Engineering

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. A voltage source consists of an emf of 10 V and a series resistance of 1 Ω. Convert this voltage source into current source.
2. State Maximum power transfer theorem for DC circuits.
3. Distinguish between real power and reactive power.
4. Find the resonant frequency of a series RLC circuit with R = 10 kΩ, L = 1 mH, C = 1μF.
5. The transformer core is made up of very thin laminations of high silicon content. Why?
6. Define: 'Voltage Regulation' of a transformer.
7. State the function of Commutator in a DC machine.
8. Enumerate the applications of single-phase induction motors.
9. List the components of Low Tension Switchgear.
10. What is meant by 'Battery backup'?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Determine the load current and power delivered to the load in the circuit shown in Figure.1 using loop current method. (10)

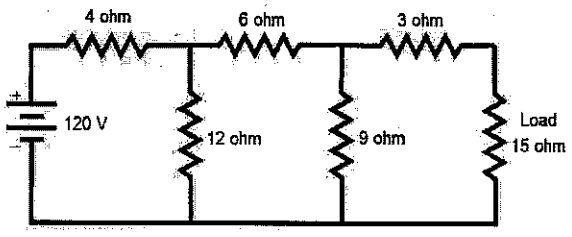

Figure.1.

ii) Derive the expression for $i(t)$ through a R-C series circuit excited by a DC voltage source of emf 'E' through a switch 'S'. (6)

(OR)

b) i) Find the current through galvanometer of resistance 1 Ω for the network shown in Figure.2 by applying Thevenin's theorem. (10)

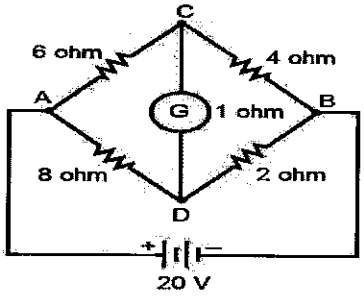

Figure.2.

ii) A 20 Ω resistor is connected in series with an unknown resistor to a 200 V supply. If the current drawn is 4 A, find the value of the unknown resistor and power in each resistor. (6)

12. a) i) Derive the expression for RMS value of a pure sinusoidal voltage waveform of peak value V_m. (6)

ii) A 440 V, 3-phase, 50-Hz AC supply is given to a balanced star connected load of impedance $(5+j3)$ Ω in each branch. Find the line current, power factor and total power. (10)

(OR)

b) i) Find the expressions for current, impedance, power factor, active power and reactive power of a series R-L circuit excited by an AC source of voltage $v(t) = V_m \sin \omega t$. (10)

ii) A 220 V, 50-Hz AC supply is applied to a series R-L-C circuit consisting of $R = 4\Omega$, $L = 0.1H$, and $C = 1\mu F$. Calculate 1) Impedance, 2) Current, and 3) Power factor. (6)

13. a) i) Explain the working principle of a transformer. (6)

ii) Derive the Equivalent circuit of a transformer. (10)

(OR)

b) i) Describe briefly the classification of magnetic materials. (6)

ii) Explain briefly the following: (10)

1. Difference between ideal transformer and practical transformer
2. Losses and Efficiency of a transformer
3. Applications of Autotransformer.

14. a) i) What are the methods of speed control of DC shunt motor? Explain any one method. (6)

ii) Explain the working principle of a 3-phase induction motor. (10)

(OR)

b) i) Describe briefly the working principle of a DC motor. (6)

ii) With neat diagrams, describe briefly the constructional features of two types of rotors in synchronous generators. (10)

15. a) i) Describe the different types of cables used for internal wiring. (10)

ii) Explain how the power factor of an inductive load can be improved using static capacitor. (6)

(OR)

b) i) What are SFU, MCB, MCCB, and ELCB? State their characteristics. (10)

ii) Write a brief note on 'Types of batteries'. (6)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18EE203 – Basic of Electrical Engineering for Metallurgy

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Draw the characteristics of ideal voltage and current source.
2. State Superposition theorem.
3. An alternating current is given by the expression $i = 50 \sin 628\, t$. Determine its RMS and average value.
4. Draw the power triangle.
5. What are the losses in a transformer and how are they minimized?
6. Compare core and shell type of transformers.
7. Why almost all large size synchronous machines are constructed with rotating field system type?
8. Define 'slip' of an induction motor.
9. What is meant by electrical earthing?
10. Mention the various types of wires used in electrical system.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) State and explain Kirchoffs laws with suitable examples. (8)

ii) For the circuit shown in figure.1, find the current through 3 Ω resistor using superposition theorems. (8)

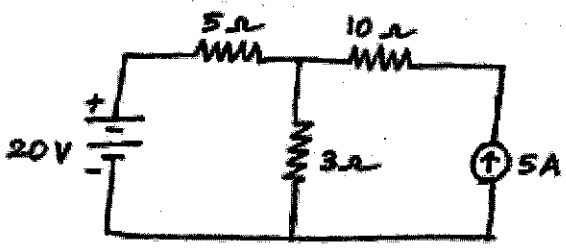

Figure.1.

(OR)

b) i) Derive an expression of transient current response of a series RL circuit with DC input. (8)

ii) Consider the network shown in figure.2. Calculate the current through 20 Ω resistor using Thevenin's theorem. (8)

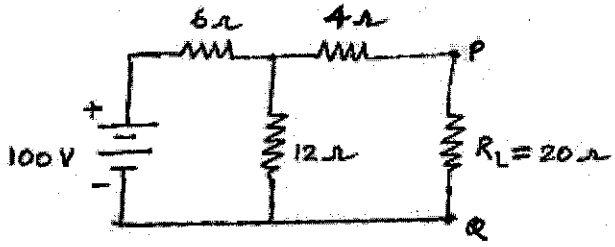

Figure.2.

12. a) i) Explain briefly the analysis of RL series circuit and derive the expression for it. (8)

ii) Explain briefly the series resonant circuit. (8)

(OR)

b) i) Derive an expression of resonant frequency of a series RLC circuit. Also discuss the main characteristics of the circuit under resonance condition with waveform and phasor diagram. (8)

ii) A three-phase 400 V, 50 Hz supply is given to a balanced star connected load of impedance of $(8 + j6)$ Ω in each branch. Determine line current, power factor, total active power and reactive power. (8)

13. a) i) Explain briefly the working of transformer on no-load and loaded conditions with the help of phasor diagrams. (8)

ii) A 40 KVA single-phase transformer has an iron loss of 450 W and full-load copper loss of 850 W. If the power factor of the load is 0.8, calculate the full-load efficiency and maximum efficiency. (8)

(OR)

b) i) Develop an approximate equivalent circuit for a single-phase transformer. (8)

ii) Derive an expression for voltage regulation of a transformer using its approximate equivalent circuit. (8)

14. a) i) Explain the methods of speed control of a DC shunt motor with necessary waveforms. (8)

ii) With the help of schematic and phasor diagram, explain the principle of operation of single phase split-capacitor type induction motor. (8)

(OR)

b) i) Explain the construction and working principle of a three-phase squirrel cage induction motor. (8)

ii) Explain with circuit diagram any two methods of starting a three-phase induction motor. (8)

15. a) i) Explain briefly the basic features and operating principles of various components of LT switchgear. (8)

ii) What is the necessity to improve power factor in electrical system? Explain the various methods of improving the power factor. (8)

(OR)

b) i) Write a short note on various types of batteries. (8)

ii) Mention the important characteristics of batteries and explain about stable of changing and depth of discharging in detail. (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING & MECHANICAL ENGINEERING

18EN101 – Professional English

Time : 3 Hours | Maximum Marks : 100

PART - A

I. Look at the following messages/notices and choose the option closest in meaning to the given statement: **(10 x 1 = 10 marks)**

1. Please keep this entrance clear.

A. Do not park in front of this entrance.
B. Always keep this door open.
C. Permission is needed to park here.

2. Supersaver tickets cannot be used on Friday.

A.You need a special ticket to travel on Friday.
B. Super saver tickets can be used on all days except Friday.
C. You can save money by travelling on a Friday.

3. Please show the librarian all the books when you leave the library.

A. The librarian will show you where to put your books.
B. The librarian needs to see your books before you go.
C. Return your books before you leave the library.

4. LIFT OUT OF ORDER. Ask if someone needs assistance.

A. The lift is only for employees who need assistance.
B. Ask someone if you need help with the lift.
C. The lift isn't working.

5. Parking in this space for doctors on duty only.

A. Tell the doctor if you want to park here.
B. Only the doctor working today can park here.
C. Park in this space only on emergency.

6. Flight cancelled due to fog. Arriving tomorrow same time. Please call this evening. Ann

A. Ann cannot fly today because of the weather conditions.
B. Ann will call the receiver of this message this evening due to fog.
C. Ann does not know when he will arrive because of fog.
Ans: _____

7. PLEASE DO NOT DISTURB. MEETING IN PROGRESS.

A. You mustn't interrupt the meeting.
B. You don't have to attend the meeting.
C. You should interrupt the meeting.

II. Read the text below and think of the word which best fits each space. Write only one word for each space: **(10x 1/2 = 5 marks)**

Writing is (26).....medium of human communication that represents language (27) ..... signs and symbols. (28)..... languages that utilize a writing system, inscriptions can complement spoken language (29)..... creating a durable version (30) ..... speech that can (31) ..... stored for future reference or transmitted across distance. Writing, in other words, is not (32) ..... language, but a tool used (33) ..... make languages readable. Within a language system, writing relies (34) ..... many of the same structures as speech, such as vocabulary, grammar, and semantics, with the added dependency of a system of signs or symbols. The result of the activity of writing (35) ..... called a text, and the interpreter or activator of this text is called a reader.

III. Match the information with the statements given below. **(5×1 = 5 marks)**

36. A brain researcher at the Australian National University in Canberra, has suggested that evolution of speech went with right-handed preference.

37. Although the human body has a symmetrical appearance when viewed externally, most internal organs are asymmetrical with respect to the left and right sides.

38. However, what is alarming, according to a writer and journalist, is the way the word "right" reinforces its own virtue. Subliminally he says, language tells people to think that anything on the right can be trusted while anything on the left is dangerous or even sinister.

39. Normally, we are not aware of the different roles that our two hemispheres play in day-to-day functions, but there are people who come to know the capabilities and functions of their two hemispheres quite well.

40. It should be no surprise then that among mathematicians and architects, left-handers tend to be more common and there are more left-handed males than females.

A. Asymmetry is a common feature of the human body.
B. Human beings started to show a preference for right-handedness when they first developed language.
C. Boys are more likely to be left-handed.
D. The two sides of the brain develop different functions before birth.
E. Society is prejudiced against left-handed people.

IV. Choose the word or phrase which best completes each sentence. **(4×1 = 4 marks)**

41. I will use this example to _____ my point more effectively.

A. portray

B. illustrate

C. depict

D. sketch

42. Moris is a very capable individual, not only is he exceptionally good at _____ his own business but he is also involved in a lot of charity work.

A. doing

B. making

C. running

D. operating

It may be supposed that although the species are numerous, the individuals of each kind are few. By the kindness of Dr Smith, I am enabled to show that the case is very different. He informs me that in one day's march with the bullock-wagons, he saw, without wandering to any great distance on either side, between one-hundred and one-hundred and fifty rhinoceroses—the same day he saw several herds of giraffes, amounting together to nearly a hundred. At the distance of a little more than one hour's march from their place of encampment on the previous night, his party actually killed eight hippopotamuses at one spot and saw many more. In this same river, there were likewise crocodiles. Of course, it was a case quite extraordinary to see so many great animals crowded together, but it evidently proves that they must exist in great numbers. Dr Smith describes that the country passed through that day as 'being thinly covered with grass, and bushes about four feet high and still more thinly with mimosa trees'.

Besides these large animals, anyone the least acquainted with the natural history of the Cape has read of the herds of antelopes, which can be compared only with the flocks of migratory birds. The numbers indeed of the lion, panther, and hyena, and the multitude of birds of prey, plainly speak of the abundance of the smaller quadrupeds. One evening, seven lions were counted at the same time prowling round Dr Smith's encampment. .As this, an able naturalist remarked to me, each day the carnage in Southern Africa must indeed be terrific! I confess that it is truly surprising how such a number of animals can find support in a country producing so little food. The larger quadrupeds no doubt roam over wide tracts in search of it; and their food chiefly consists of underwood, which probably contains many nutrients in a small bulk. Dr. Smith also informs me that the vegetation has a rapid growth; no sooner is a part consumed, than its place is supplied by a fresh stock. There can be no doubt, however, that our ideas respecting the apparent amount of food necessary for the support of large quadrupeds are much exaggerated. The belief that where large quadrupeds exist, the vegetation must necessarily be luxuriant is more remarkable because the converse is far from true.

Mr. Burchell observed to me that when entering Brazil, nothing struck him more forcibly than the splendour of the South American vegetation contrasted with that of South Africa, together with the absence of all large quadrupeds. In his travels, he has suggested that the comparison of the respective weights (if there were sufficient data) of an equal number of the largest herbivorous quadrupeds of each country would be extremely curious. If we take on the one side, the elephants, hippopotamus, giraffe, boscaffer, elan, five species of rhinoceros; and on the American side, two tapirs, the guanaco, three deer, the vicuna, peccari, capybara (after which we must choose from the monkeys to complete the number), and then place these two groups alongside each other; it is not easy to conceive ranks more disproportionate in size. After the above facts, we are compelled to conclude, against the anterior probability that among the Mammalia there exists no close relation between the bulk of the species, and the quantity of the vegetation in the countries which they inhabit.

Answer the following questions by choosing the most appropriate option.

57. What is the primary concern of the author?

a) Discussing the relationship between the size of mammals and the nature of vegetation in their habitats

b) Contrasting ecological conditions in India and Africa

c) Proving that large animals do not require much food

d) Describing the size of animals in various parts of the world

58. According to the author, what has led to the 'prejudice'?

a) Errors in the reasoning of biologists

b) False ideas about animals in Africa

c) Incorrect assumptions on the part of geologists

d) Doubt in the mind of the author

71. a. Imagine yourself to be the Team Leader in TCS and send a mail to your team appreciating their success in completion of the Project. (10 Marks)

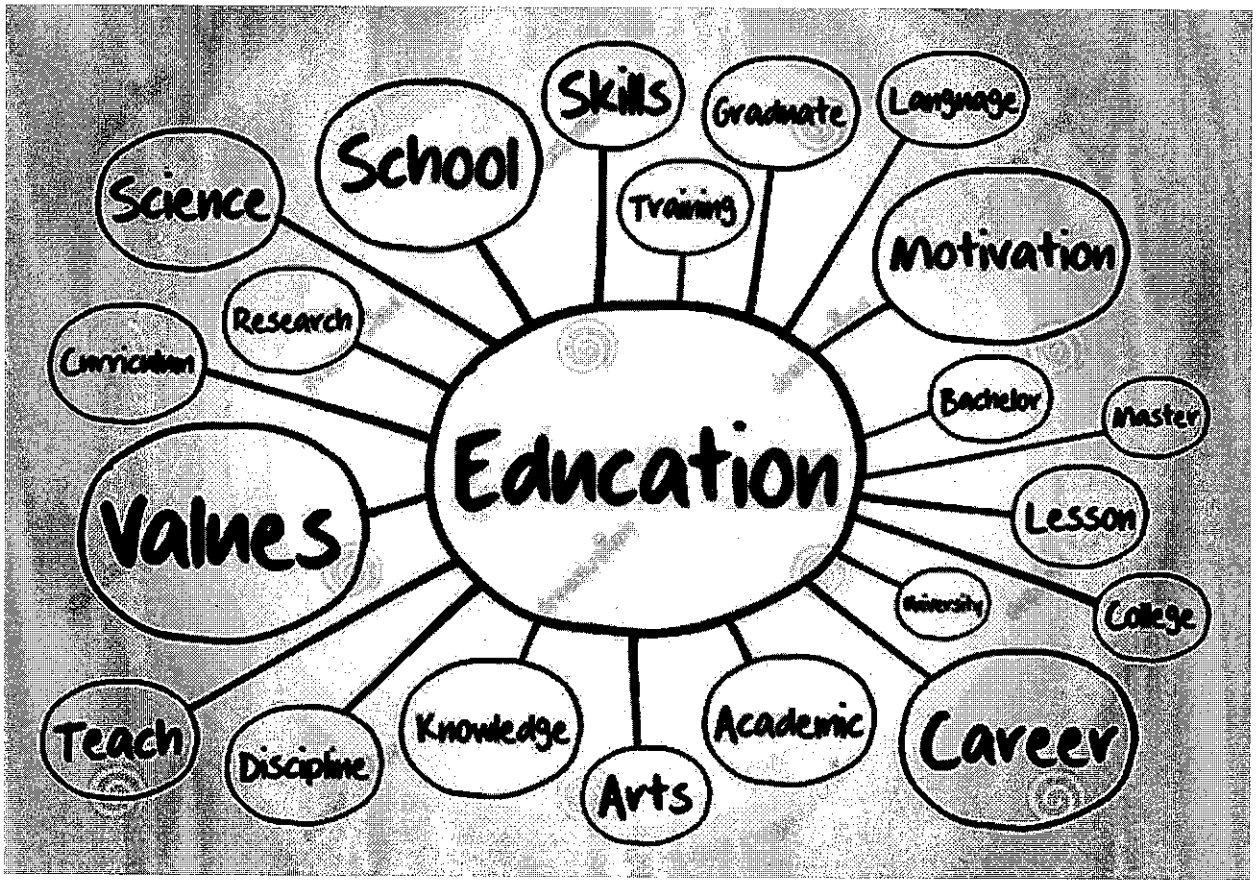
(OR)

b. Read the following advertisement published in "The Hindu" dated 13.11.21 and write a letter of application. Hyundai, the leader in the automobile industry requires the following personnel: Deputy Manager, Design and Development. Requirements: B. E/ B. Tech. graduates with 10 to 12 years of experience in industry. (10 Marks)

72. a. Write a report on a fire accident which you witnessed in your manufacturing unit last week with suitable recommendations (150 words). (10 Marks)

(OR)

b. Write a meaningful paragraph based on the mind map given below (150 words). (10 Marks)



Government College of Engineering :: Salem

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B.E. Degree Examinations – April/May 2022

I Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTCY101 – Environmental Science and Engineering

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List any two causes for landslides.
2. Recall the term Eutrophication.
3. Infer the criteria for recognizing hot spots.
4. Define the term biodiversity.
5. Identify any four heavy metals present in waste water.
6. Define photochemical smog.
7. Choose the method for the disposal of e-waste.
8. Identify the chemical responsible for ozone layer depletion.
9. List any two-screening test to detect AIDS.
10. Arrange the reason for population explosion.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Recall the environmental impacts of extracting mineral resources. (8)

ii) Construct ecological pyramids and hydrological cycle with details. (8)

(OR)

b) i) Analyze the environmental effects of modern agriculture. (8)

ii) List the causes and consequences of deforestation. (8)

12. a) i) Compare food chain and food web. (8)

ii) List the various stages of ecological succession. (8)

(OR)

b) i) Construct the energy flow in ecosystem. (8)

ii) Choose the methods for the conservation of biodiversity. (8)

13. a) i) What are the sources, effects, and control measures of air pollution (8)

ii) Summarize the various steps employed in wastewater treatment. (8)

(OR)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTEEG201 – Electrical Technology

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Draw the block diagram of an electrical drive.
2. List the factors to be considered for the selection of electrical drives.
3. Draw the mechanical characteristic of a DC shunt motor.
4. What is called braking of electrical motor?
5. Name the types of starter suitable for three phase squirrel cage induction motor.
6. Analyze the protective devices used in a DC motor starter.
7. What are the advantages of DC series motor?
8. Give the applications of DC drives.
9. What is the inverter in AC drives?
10. List out the advantage of slip power recovery scheme speed control of AC motor.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What are the different classes of motor duty? (8)

ii) Describe the selection of motor rating for drive motors with regard to Load variation factors. (8)

(OR)

b) i) Draw and discuss about heating and cooling curves. (8)

ii) Discuss on various Types of Electric Drives. (8)

12. a) i) Explain speed-torque characteristics of different types of load with graph. (8)

ii) Draw and discuss the mechanical characteristics of a three phase induction motor. (8)

(OR)

b) i) List out different braking methods used for DC motors. Explain in detail about any one method of braking. (8)

ii) Explain the different types of braking of three phase induction motors. (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

COMMON TO ALL BRANCHES

16PTMA201 – Mathematics - II

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State Dirichlet's condition for the existence of Fourier series.
2. Find the value of a_0, a_n in the Fourier series expansion of f (x) $= x^3$ in $-\pi < x < \pi$.
3. An insulated rod of length 60 cm has its ends A and B maintained at 20°C and 80°C respectively. Find the steady state solution of the rod.
4. Write the initial and boundary conditions of the problem: "A rectangular plate is bounded by the lines x = 0, y = 0, x = a and y = b. Its surfaces are insulated. The temperature along the two adjacent edges is kept at 100°C , while the temperature along the other two edges is at 0°C.
5. Find L $[e^{-2t}\, t^2]$.
6. Find $L^{-1}\left[\frac{1}{s(s^2+4)}\right]$.
7. Find the Fourier transform of the function $e^{-|x|}$.
8. Prove that F [f (x−a)] = e^{ias} F (S), if F [f(x)] = F (S).
9. Find: Z $\left[\frac{1}{n}\right]$
10. State the Convolution theorem on Z – transform.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Obtain the Fourier series for f(x) $= x^2$ in $-\pi < x < \pi$. Deduce that (16)

    i) $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\ldots\infty$

    ii) $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\ldots\infty$

    (OR)

    b) Find the Cosine series for f(x) = x in $(0,\pi)$ and then using Parseval's identity. (16)
    Show that $\frac{\pi^4}{96}=\frac{1}{1^4}+\frac{1}{3^4}+\frac{1}{5^4}+\ldots\infty$

12. a) A tightly stretched string of length l has its ends fastened at x = 0 and x = l. At (16)
    time t = 0, the string is given a shape defined by f (x) = k x ($l - x$), and then released from rest. Find the displacement of the string at any time.

    (OR)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE201 – Electromagnetic Theory

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Given two vectors: $\vec{P} = 3\vec{i} + 5\vec{j} + 2\vec{k}$ and $\vec{Q} = 2\vec{i} - 4\vec{j} + 3\vec{k}$. Determine the angular separation between them.
2. Determine the electric field intensity in free space if $\vec{D} = 30\,\vec{a}_x$ C/m².
3. Differentiate 'Electrical potential at a point' and 'Potential difference between two points'.
4. Define the term: Dielectric strength.
5. Distinguish between magnetic scalar potential and magnetic vector potential.
6. State Ohm's law for magnetic circuits.
7. Calculate the emf induced in a circuit having an inductance of 700 μH if the current through it varies at the rate of 5000 A/sec.
8. How does displacement current differ from conventional current?
9. Determine the intrinsic impedance of free space.
10. State the practical importance of 'Skin depth'.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) With neat diagrams, explain the Spherical system with co-ordinates (R, θ, ϕ). (8)

    ii) Apply Coulomb's law to find the electric field intensity at any point P due to a straight, uniformly charged wire of linear charge density $+\lambda$ C/m. The point P is at a distance of 'h' m above the wire. (8)

(OR)

    b) i) State and prove Stoke's theorem. (8)

    ii) By means of Gauss's law, determine the electric field intensity inside and outside a spherical shell of radius R. The shell contains a total charge Q uniformly distributed over the surface. (8)

Government College of Engineering :: Salem

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

16PTEC201 – Engineering Electromagnetics

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State the Coulomb's Law
2. Define electric scalar potential.
3. Write Lorentz's force equation for a moving charge.
4. If the magnetic field $H = 25\bar{a}_x + 12\bar{a}_y + a\bar{a}_z$. Find the value of α?
5. Write the boundary conditions for electric field.
6. Find the magnetization in a magnetic material where $\mu = 1.8 \times 10^5$ H/m and H = 120A/m.
7. Define Faradays law for electric field.
8. What are the expressions for instantaneous and complex Pontying vector?
9. Define skin depth.
10. What is Brewster angle?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) State the Gauss Law and express the mathematical representation of Gauss law. (8)

    ii) Derive the relationship between potential and electric field. (8)

(OR)

    b) i) Find an electric field intensity $\bar{E}$ due to an electric dipole. (8)

    ii) Given that potential $V = 10 \sin\theta \cos\Phi / r^2$. Find the electric flux density at $\left(2, \frac{\pi}{2}, 0\right)$. (8)

12. a) i) Derive the magnetic field intensity on the axis of circular loop carrying current I. (8)

    ii) State and explain Ampere's circuital law with an example. (8)

(OR)

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B.E. Degree Examinations – April/May 2022

II Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCY201 – Environmental Science and Engineering

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define types of mines.
2. Recall the effects of fertilizers.
3. Explain the term ecosystem.
4. Summarize the values of biodiversity.
5. Identify the sources of air pollution.
6. Select a method to improve the dissolved oxygen in water.
7. Distinguish the various types of e-waste.
8. List the main effects of natural disaster.
9. Compare unsustainable and sustainable development.
10. Examine the importance of environmental ethics.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	i)	Why deforestation is considered too important to conserve nature.	(8)
		ii)	Show the various parts of hydrological cycle with a neat diagram.	(8)
			(OR)	
	b)	i)	Define Land degradation with example.	(8)
		ii)	Which factors affects the food and mineral resources.	(8)
12.	a)	i)	Explain food chain and food web.	(8)
		ii)	Infer and discuss ecological pyramids and ecological succession.	(8)
			(OR)	
	b)	i)	Outline methods for conservation of biodiversity.	(8)
		ii)	Summarize the hot spots of biodiversity.	(8)
13.	a)	i)	Select best method to reduce air pollution from thermal power plant.	(8)
		ii)	Identify main sources and methods for reduction of water pollution.	(8)
			(OR)	

Government College of Engineering :: Salem

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B.E. Degree Examinations – April/May 2022

I Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE102 – DC Machines and Transformers

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Co-energy.
2. Write the applications of singly excited and doubly excited magnetic system.
3. Define the term commutation in dc machines.
4. Under what condition the mechanical power developed in a dc motor will be maximum?
5. What is the function of a no-voltage release coil provided in a dc motor starter?
6. Name any four applications of DC series motor.
7. Mention the difference between core and shell type transformers.
8. Why transformers are rated in KVA?
9. How can the iron loss be minimized in a transformer?
10. Why brake test is not suitable for large size machines?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive the expression for the r.m.s value of emf induced in a.c. machines. (8)

ii) Prove that mmf wave of a single phase ac winding is pulsating or standing. (8)

(OR)

b) i) Explain various concepts of magnetic fields in rotating machines. (8)

ii) What are the special applications where the electric field is used as a coupling medium for electromechanical energy conversion? Also explain why electric field coupling is preferred in such applications? (8)

b) i) Draw and explain the no load phasor diagram of a single phase transformer. (8)

ii) List the applications, advantages and disadvantages of auto transformer. (8)

15. a) i) Discuss the details of Hopkinson's test for DC machines. Why is it called regenerative? (8)

ii) A 230 V, 10 HP shunt motor takes a full load line current of 40 A. The armature and field resistances are 0.25 Ω and 230 Ω respectively. The total brush contact drop is 2 V and the core and friction losses are 380 W. Calculate the efficiency of the motor. Assume that the stray load loss is 1% of the rated output. (8)

(OR)

b) i) Draw the circuit diagrams for conducting OC and SC tests on a single phase transformer. Also explain how the efficiency and voltage regulation can be estimated by these tests. (8)

ii) A 500 kVA transformer has an iron loss of 500 W and full load copper loss 700 W. Calculate the efficiency at $3/4^{th}$ full load 0.8 power factor. (8)

Government College of Engineering :: Salem

(An Autonomous Institution Affiliated to Anna University, Chennai)

B.E. Degree Examinations – April/May 2022

I Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME101 – Engineering Thermodynamics

(Use of steam tables, Mollier diagram, Psychometric chart and refrigerant property tables are permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Prove that for an isolated system, there is no change in internal energy.
2. Define Zeroth law of Thermodynamics.
3. Distinguish between reversible and irreversible process.
4. State Carnot theorem.
5. How do you determine the state of steam?
6. What the advantages are of reheat cycles?
7. Is water vapour is ideal gas? Why?
8. What is equation of state?
9. Differentiate absolute humidity and relative humidity.
10. What is the important psychometric process?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Describe steady flow energy equation and (16)
ii) Deduce suitable expression for the expansion of gas in a gas turbine with suitable assumptions.
iii) Apply the equation to a nozzle and derive an equation for velocity at exit.
iv) Derive the suitable expression for the ideal compressor and specify the assumptions.

(OR)

b) Explain the following; (16)
i) Point and path function
ii) Property, state
iii) Process, path
iv) Quasi- static process.

(OR)

b) i) Write down the Dalton's law of partial pressure and explain its importance. (6)

ii) 0.45 kg of CO and 1 kg of air is contained in a vessel of volume 0.4 m^3 at 15°C. Air has 23.3% of O_2 and 76.7% of N_2 by mass. Calculate the partial pressure of each constituents and total pressure in the vessel. Molar masses of CO,O_2 and N_2 are 28, 32 and 28 kg/k mol. (10)

15. a) Atmospheric air at a pressure of 760 mm Hg has a temperature of 32°C and percentage saturation as determined from a psychrometric chart of 52%. Calculate (16)

i) The partial pressure of the vapour and the dry air

ii) The specific humidity

iii) The dew point

iv) The density of the mixture.

(OR)

b) An air conditioning system is to take in outdoor air at 263°K and 30 percent relative humidity at a steady rate of 45 m^3/min and to condition it to 298°K and 60 percent Relative humidity. The outdoor air is first heated to 295°K in the heating section and then humidified by the injection of hot steam in the humidifying section. Assuming the entire process takes place at a pressure of 100 kPa, determine (16)

i) the rate of heat supply in the heating section and

ii) the mass flow rate of the steam required in the humidifying section.

Government College of Engineering :: Salem

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18MA205 – Differential Equations and Transforms

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Find the Particular Integral of $(D^2 - 4D + 4)\, y = e^{-2x}$.
2. Transform the equation $(x^2D^2 + 3xD + 5)y = x\, sin(logx)$ in to an ordinary differential equation with constant co-efficient.
3. Form a P.D.E by eliminating arbitrary constants from $z = (x - a)^2 + (y - b)^2 + 1$.
4. Solve $p + q = pq$.
5. Find the Complementary function of $\left(D^2 - 6DD' + 9D'^2\right) y = e^{x-y}$.
6. Write the one dimensional diffusion equation.
7. Find : $L[e^{-2t} + 5\, e^{3t}]$.
8. State Final value theorem of Laplace transforms.
9. Define Fourier Transform pair.
10. Find the Fourier sine Transform of e^{-x}.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Solve $(D^2 + 6D + 9)y = e^{-3x} + sin3x$. (8)

ii) Solve $(D^2 + 4)\, y = \cot 2x$ by the method of variation of parameters. (8)

(OR)

b) i) Solve $(x^2D^2 - xD + 1)\, y = sin(logx)$. (8)

ii) Solve the Simultaneous equations (8)

$\frac{dx}{dt} + y = sint$; $\frac{dy}{dt} + x = cost$; given $x(0) = 2$ & $y(0) = 0$.

12. a) i) Form a P.D.E by eliminating arbitrary function from (8)

$z = f(x + c\, t) + \emptyset(x - c\, t)$.

ii) Solve $z = px + qy + \sqrt{1 + p^2 + q^2}$. (8)

(OR)

b) i) Solve $p(1 + q) = qz$. (8)

ii) Solve $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$ (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18MA204 – Fourier Series and Transforms

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State whether $y = \tan x$ can be expanded as a Fourier series. If so how? If not why?
2. Find the value of b_n in the expansion of the function $f(x) = \cos x$ as a Fourier series in the interval $(-\pi, \pi)$.
3. In the one dimensional Wave equation $y_{tt} = c^2 y_{xx}$, what does c^2 stand for?
4. Write all various possible solutions of one dimensional heat equation.
5. State initial and final value theorems in Laplace Transform.
6. Determine the Laplace Transform of $\cos^2(3t)$.
7. State and prove the Modulation property in Fourier transform.
8. Find the Fourier Sine transform of $(1/x)$.
9. Prove that $Z[a^n] = z/(z-a)$.
10. Write the Convolution theorem on Z-transform.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Find the Fourier series of the function $f(x) = x(2\pi - x)$ in the interval $(0, 2\pi)$. (8)

ii) Determine the Fourier Sine series of $f(x) = l - x \ in \ (0, l)$. (8)

(OR)

b) i) Find the half range Fourier Cosine series of $f(x) = x$ in $(0, \pi)$. (8)

ii) Determine the Fourier series upto second harmonic for the given data below in the table: (8)

x	0	π/3	2π/3	π	4π/3	5π/3	2π
y	1.0	1.4	1.9	1.7	1.5	1.2	1.0

12. a) A taut string of length $2l$ is fastened at both ends. The mid point of the string is taken to a height b and then released from rest in that position. Find the displacement of string. (16)

(OR)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18MA203 – Differential Equations and Laplace Transforms

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Find the complementary function of $(D^3 + 4D^2 + 4D)y = 1 + x^2$.
2. Convert $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = x^2\cos(logx)$ into Equation with constant coefficient.
3. Form the partial differential equation from $z = f(x^2 - y^2)$ by eliminating the arbitrary function.
4. Find the singular solution of $z = px + qy + pq$.
5. Find the particular integral of $(D^2 - 2DD' + 2D'^2)z = \sin(x - y)$.
6. Solve: $(D^4 - D'^4)z = 0$
7. Find: $L\left\{\frac{1-cosat}{t}\right\}$.
8. Find: $L^{-1}\left\{\frac{s}{(s+3)^5}\right\}$.
9. Write down the iterative formula for $\sqrt{N}$ in Newton's method.
10. State two difference between direct and iterative methods for solving system of equations.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Solve : $(D^2 - 5D + 6)y = e^x\cos 2x$. (8)

ii) Solve the simultaneous equations: $\frac{dx}{dt} + 4x + 3y = t$; $\frac{dy}{dt} + 2x + 5y = e^{2t}$. (8)

(OR)

b) i) Solve: $(x^2D^2 - 3xD + 4)y = x^2\cos(logx)$ (8)

ii) Solve: $(D^2 + a^2)y = tanax$ by method of variation of parameters. (8)

12. a) i) Form the partial differential equation by eliminating the arbitrary functions from $z = xf\left(\frac{y}{x}\right) + yg(x)$. (8)

ii) Solve: $(3z - 4y)p + (4x - 2z)q = 2y - 3x$ (8)

(OR)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18MA202 – Differential Equations and Linear Algebra

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Find the complementary function of $(D^3 + D^2 - D - 1)y = x^2 + 2$.
2. Solve: $(x+1)^2 \frac{d^2y}{dx^2} + (x+1)\frac{dy}{dx} + y = 0$.
3. Form the PDE from $z = (x^2 + a)(y^2 + b)$ by eliminating the arbitrary constant.
4. Find the complete solution of $\sqrt{p} + \sqrt{q} = 1$.
5. Solve: $\frac{\partial^3 z}{\partial x^3} - 4\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial x \partial y^2} = 0$.
6. Find the particular integral of $(D^2 - 2DD' + 2D'^2)z = \sin(x - y)$.
7. Find the rank of the matrix $\begin{pmatrix} 1 & -7 & 3 & -3 \\ 7 & 20 & -2 & 25 \\ 5 & -2 & 4 & 7 \end{pmatrix}$
8. Write down the iterative formula for $\sqrt{N}$ in Newton's method.
9. Show that intersection of any two subspaces of a vector space is also a subspace.
10. Show that the set $S = \{(1,2,1), (3,1,5), (3,-4,7)\}$ is a base for $V_3(R)$.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Solve: $(D^2 - 4D + 3)y = \sin 3x + x^2$. (8)

ii) Solve the simultaneous equations: $\frac{dx}{dt} + 2x - 3y = 5t$; $\frac{dy}{dt} - 3x + 2y = 2e^{2t}$. (8)

(OR)

b) i) Solve: $(x^2D^2 - xD + 4)y = x^2\sin(\log x)$. (8)

ii) Solve: $y'' + 7y' - 8y = e^{2x}$ by method of variation of parameters. (8)

12. a) i) Form the PDE by eliminating the arbitrary functions f and g in (8)

$z = xf\left(\frac{y}{x}\right) + yg(x)$.

ii) Find the general solution of $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$ (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING / METALLURGICAL ENGINEERING

18MA201 – Differential Equations and Complex Variables

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Solve: $\frac{d^2y}{dx^2}+\frac{dy}{dx}-2y=0$

2. Eliminate 'y' from the following simultaneous differential equations
$\frac{dx}{dt}+2y=-\sin t;\ \frac{dy}{dt}-2x=\cos t$

3. Form the partial differential equation by eliminating the arbitrary constants a and b from $z=(x+a)^2+(y+b)^2$

4. Solve: $\sqrt{p}+\sqrt{q}=1$.

5. Write the nature of the partial differential equation $\frac{\partial^2 u}{\partial x^2}+4\frac{\partial^2 u}{\partial x\partial y}+\frac{\partial^2 u}{\partial y^2}=0$.

6. The ends A and B of a rod of length 10 cm long have their temperature kept at $30°C$ and $90°C$. Find the steady state temperature distribution on the rod.

7. Define analytic function.

8. Find the fixed points of the transformation $w=\frac{3z-4}{z-1}$

9. Evaluate : $\int_c \frac{z}{(z-2)}dz$, where C is the circle $|z|=3$

10. Fine the residue of $f(z)=\frac{z+2}{(z-1)^2(z-2)}$ at its poles.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Solve: $(D^2-4D-5)y=e^{5x}+\cos x$. (8)

ii) Solve: $x^2\frac{d^2y}{dx^2}-3x\frac{dy}{dx}+4y=x^2+\cos(\log x)$ (8)

(OR)

15. a) i) Evaluate: $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$, where C is the circle $|z| = 3$ using Cauchy's integral formula. (8)

ii) Express the function $f(z) = \frac{1}{(z-1)(z-2)}$ as a Laurent's series valid in the region (i) $1 < |z| < 2$ (ii) $|z| < 1$ (8)

(OR)

b) i) Evaluate: $\int_0^{2\pi} \frac{d\theta}{13 + 5\sin\theta}$ (8)

ii) *Evaluate* : $\int_c \frac{2z-1}{z(z+1)(z-3)} dz$ Where C is the circle |z|=2, Using Cauchy's residue theorem. (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18PH202 – Physics – Waves and Optics and Quantum Mechanics

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. A spring of stiffness factor 98 N/m is pulled through 20 cm. Find the restoring force and calculate the mass which is attached in spring.
2. Infer the expression to find the frequency of vibrating string.
3. Define mirage.
4. Write the equation for power by refracting matrix method.
5. Recall interference of light.
6. Define dispersive power of grating.
7. List out the properties of laser.
8. Recall population inversion
9. State uncertainity principle.
10. Determine the debroglie wavelength of an electron accelerated by a potential difference of 150 V.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive the wave equation for simple harmonic motion. (12)

ii) Write a short note on Forced vibrations. (4)

(OR)

b) i) Discuss the velocity of a transverse wave along a stretched string. (12)

ii) Distinguish between progressive wave and stationary wave. (4)

12. a) i) On the basis of Fermets principle, derive law of reflection and refraction. (12)

ii) Discuss total internal reflection. (4)

(OR)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18PH201 – Semiconductor Physics and Optoelectronics

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define carrier concentration in metals.
2. Write the postulates of band theory of solids.
3. Define ionization energy.
4. Draw the energy level diagram for P type semiconductor.
5. Define knee voltage.
6. Distinguish between drift current and diffusion current in semiconductors.
7. Define stimulated absorption.
8. Write the Principle of SEED.
9. State Photovoltaic effect.
10. Define Quantum well.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	i)	Write the postulates of classical free electron theory.	(6)
		ii)	Obtain an expression for density of states.	(10)
			(OR)	
	b)	i)	Describe Brillouin zones with E-K diagram.	(6)
		ii)	Explain the effect of temperature on Fermi function.	(10)
12.	a)	i)	Derive an expression for carrier concentration in intrinsic semiconductor.	(12)
		ii)	Discuss about Direct band gap semiconductors.	(4)
			(OR)	
	b)	i)	Obtain an expression for carrier concentration in N type semiconductor.	(12)
		ii)	The electron and hole mobilities of semiconductor are 0.6 and 0.2 $m^2/V\text{-}S$ respectively. At room temperature, the resistivity of semiconductor is $2X10^{-4}$ ohm-m. Assuming that the material is intrinsic, determine its intrinsic carrier density at room temperature (300 K).	(4)

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B.E. Degree Examinations – April/May 2022

I & II Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING / ELECTRONICS AND COMMUNICATION ENGINEERING

18PH102 – Physics - Electromagnetism

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define electric flux density. Write its unit.
2. State Gauss's law.
3. Differentiate linear, isotropic and homogeneous dielectrics.
4. Calculate the capacitance of a capacitor, its plates are 20 cm X 3 cm and are separate by a 1.0 mm air gap.
5. State Biot-Savart's law.
6. Define magnetic susceptibility.
7. Define Faraday's law.
8. Mention the reason why $\Delta.B = 0$?
9. State Brewster's law.
10. Define Radiation pressure.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive an expression for electric field intensity due to a charged infinite plane sheet using Gauss's theorem. (10)

ii) A spherical charge distribution of 7.52×10^{-5}C has a radius of 5.25×10^{-3} m. Find the electric field intensity at (6)

1. 5.00 cm from the charge and
2. 3.25×10^{-3} m inside the charge.

(OR)

b) i) Obtain an expression for energy density in an electrostatic field. (10)

ii) Define electrostatic potential energy and deduce an expression for electrostatic potential energy of a system of n point charges. (6)

12. a) i) Derive an expression for the capacitance of a parallel plate capacitor. (12)

ii) A dipole is consisting of an electron and proton 4×10^{-10} m apart. Compute the electric field at a distance of 2×10^{-8} m on a line making of angle 45° with the dipole axis from the centre of the dipole. (4)

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B.E. Degree Examinations – April/May 2022

I Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18MA101 – Matrices and Calculus

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Two eigen values of the matrix $\begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$ are 0 and 1, obtain the third eigen value.
2. List the applications of Cayley-Hamilton theorem.
3. Compute the Curvature of a circle $x^2 + y^2 = 25$ at any point on it.
4. Define Evolute.
5. If u = $\frac{y}{z} + \frac{z}{x}$ then find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$.
6. If x = u (1 + v) and y = v (1 + u) then deduct the Jacobian of x, y with respect to u , v .
7. Evaluate $\iint dxdy$ over the region bounded by x = 0; x = 2; y = 0; y = 2.
8. Evaluate $\int_0^2 \int_0^3 \int_0^1 xy^2z \; dz \, dy \, dx$.
9. Compute the greatest rate of increase of $\varphi = xyz^2$ at (1, 0, 3).
10. Show that $\vec{F} = (x + 2y)\vec{i} + (y + 3z)\vec{j} + (x - 2z)\vec{k}$ is Solenoidal.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Find the Eigen values and Eigen vectors of the matrix A = $\begin{pmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{pmatrix}$. (8)

ii) Verify Cayley Hamilton theorem for the matrix $\begin{pmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{pmatrix}$. (8)

(OR)

b) Reduce the quadratic form $6x^2 + 3y^2 + 3z^2 - 4xy - 2yz + 4zx$ into canonical form by an orthogonal transformation and hence determine its nature. (16)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2018 Regulations)

MTEALLURGICAL ENGINEERING

18PH101 – Physics - Mechanics

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the equation for position coordinate in the case of uniform accelerated rectilinear motion.
2. Show the relation for position coordinates of three blocks in dependent motions.
3. Define dynamic equilibrium.
4. Differentiate Inertial and non inertial frame of reference.
5. Give the principle of conservation of linear and angular momentum of a system of particles.
6. State Keplers law of planetary motion.
7. Name the different types of motion of rigid body.
8. Define radius of gyration.
9. Define simple harmonic motion.
10. Give the condition for resonance in damped forced vibration.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Discuss the rectilinear motion of particles with respect to position, velocity and acceleration. (12)

ii) The vertical motion of mass A is defined by the relation $x = 10sin2t + 15\cos 2t + 100$, where x and t are expressed in mm and seconds respectively. Determine the position, velocity and acceleration when t = 1 s. (4)

(OR)

b) i) Explain the curvilinear motion of particles. (12)

ii) Discuss the relative motion of two particles. (4)

12. a) i) Discuss the forces of mechanics. (12)

ii) Write a short note on friction. (4)

(OR)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2012 Regulations)

CIVIL ENGINEERING

12CE603 – Steel Structures (Limit State Design)

(Use of IS800-2007, IS6533-1971 and Steel Tables are Permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. List the types of connections.
2. Draw neat sketch of beam to beam connection.
3. What are the forces considered in design of chimney?
4. Illustrate self-supporting type chimney.
5. Define dome of a tank.
6. Mention the demerits of rectangular water tanks.
7. When gantry girder is used?
8. Draw the neat sketch of plate grinder and label the parts.
9. Write the types of roof trusses.
10. Recall the term purlin.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Write down the step – by step procedure involved in design of beam to beam connection. (16)

(OR)

b) Design a seat connection for a factored beam and reaction of 110 kN. The beam section is 15MB250@365.9 N/m connected to the flange of column section 15HB200@365.9 N/m using bolted connection. Steel is Fe410 grade and bolts are of grade 4.6. (16)

12. a) Design a self-supporting chimney at the outskirts of Salem. The height of the chimney is 80 m and its diameter is 3 m. (16)

(OR)

b) In detail discuss the design of foundation for chimney with sketches. (16)

13. a) Design a circular steel water tank with a flexible base for a capacity of 5,00,000 litres. (16)

(OR)

b) Discuss the design procedure for staging and foundation for steel circular water tank. (16)

14. a) Write down the step by step procedure of design of gantry girder in detail. (16)

(OR)

b) A plate girder is used for a span of 22 m. It is subjected a UDL of 42 kN/m. Assuming 2500 mm x 8 mm web plate pairs of ISA 150 x 150 x 15 mm angles and 400 mm x 20 mm flange plates, design the bearing stiffener at the support. (16)

15. a) Design an angle section purlin for a trussed roof for the following data (16)

Span of the truss	: 10 m
Spacing of truss	: 4 m c/c
Spacing of purlin along the slope of truss	: 2 m c/c
Wind load on purlin normal to roof	: 10 N/m^2
Vertical load from roof covering	: 0.2 kN/m^2

Slope of the truss is 1 Vertical and 2 horizontal.

(OR)

b) Discuss briefly the following with neat sketches. (16)

i) Bracing system in roof truss

ii) Connection of purlin to rafter

iii) Anchorages of truss with concrete column.

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B.E. Degree Examinations – April/May 2022

VIII Semester (Full Time)

(2012 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

12EE801 – Utilization of Electrical Energy

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What is tip - speed ratio in wind energy conversion system?
2. List different types of tariff.
3. Why thermal type starter for use in fluorescent tubes have become Obsolete nowadays?
4. Differentiate between candela and lux.
5. Name few applications of infrared heating.
6. Why alternating current is found most suitable for resistance welding?
7. What are the major disadvantages of tramway?
8. The resistors are employed for control of traction motors are designed for short-time rating. Why?
9. List the factor governing selection of motor for a drive.
10. What are the applications of electric drives?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) With neat diagram explain how electrical energy is generated from nuclear power plant. (8)

    ii) Discuss about advantages and disadvantages of renewable energy system. (8)

(OR)

    b) i) Discuss in detail about the need for electrical energy conservation. (8)

    ii) List the applications of conventional and non-conventional energy method of energy generation. (8)

12. a) i) Discuss various factors to be taken into account for designing schemes for (8)

        1. Street lighting
        2. Flood lighting.

    ii) Prove that in a filament lamp the diameter of filament is directly proportional to $I^{2/3}$. Where I is the current flowing in the filament? (8)

(OR)

b) i) State and describe various types of lighting scheme. (8)

ii) How does designing of indoor and outdoor system differ? Explain methods for designing an indoor system. (8)

13. a) i) Explain different methods of induction heating and describe coreless type of induction furnace. (8)

ii) Discuss different applications where dielectric heating and induction heating are used. (8)

(OR)

b) i) Describe various types of arc welding processes used in industry. (8)

ii) Compare ac and dc welding methods. (8)

14. a) i) Write short notes on (8)

1. Speed control of dc series motor and
2. Metadyne control.

ii) Prove the suitability of squirrel cage induction motor for traction drives. (8)

(OR)

b) i) Explain multiple unit control of DC motor. (8)

ii) What are the advantages and disadvantages of regenerative braking of electric traction motor? (8)

15. a) i) Explain which properties make series motor more suitable for heavy torque applications. Also discuss various methods for controlling speed of dc series motor. (8)

ii) Differentiate between group drive and individual drive and give their merits. (8)

(OR)

b) i) Discuss the different types of drives required for transmission of power from the driving machines to the loads. (8)

ii) Suggest suitable type of motors with reasons for textile mill and paper mill drives. (8)

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B.E. Degree Examinations – April/May 2022

II Semester (Full Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16ME101 – Engineering Graphics

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Draw the projection of point A, Which is 40 mm below HP and 25 mm behind VP.
2. Which quadrants are not used in projections? Why?
3. Name some polyhedrons.
4. Draw the front view and top view of a cone have 30 mm diameter and 40 mm height, which is rest on its base.
5. Mention any two rules to be followed for drawing hatching line in sectioning.
6. What are the two types of development of surfaces?
7. Define isometric scale.
8. What is the shape of circle in isometric view?
9. What are the types of perspective projection?
10. Write any two applications of perspective projection.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) The point A of a line AB is in HP and 70 mm in front of VP. The point is in VP and 50 mm above HP. The distance between projectors is 70 mm. Draw the projections of the line, find the true length, inclinations and locate its traces. (16)

(OR)

b) A hexagonal plate of side 20 mm rests on the HP on one of its sides inclined at 45° to the VP. The surface of the plate makes an angle of 30° with the HP. Draw the front and top views of the plate. (16)

12. a) A pentagonal prism of base side 30 mm and axis length 60 mm rest on the HP on one of its base edges with its axis inclined at 60° to the HP and parallel to the VP. Draw its front and top views. (16)

(OR)

b) A cylinder of diameter 35 mm and axis length 70 mm rests on the HP on one of its base edges with its axis inclined at 50° to HP and parallel to the VP. Draw its top and front views. (16)

13. a) A square prism of base side 30 mm and axis length 60 mm lies on the HP on one of its longer edges with its axis parallel to both HP and VP. It is cut by a vertical plane inclined at 45° to the VP. The cutting plane meets the axis at 15 mm from one end of the prism. Draw plan, sectional elevation and true shape of the section. (16)

(OR)

b) A pentagonal pyramid of base edge 25 mm and height 60 mm rests vertically on its base on the HP such that one of its base edge parallel to VP. It is cut by a plane, inclined at 60° to HP and passes through a point 35 mm from the apex. Draw the development of the lateral surface of the pyramid. (16)

14. a) A hexagonal pyramid of base side 30 mm and height 65 mm stands with its base on HP with an edge of base parallel to VP. A horizontal plane cuts the pyramid and passes through a point on the axis at a distance of 30 mm from the apex. Draw the isometric projection of the frustum of the pyramid. (16)

(OR)

b) A cylinder of 50 mm diameter and 60 mm height stands on HP. A section plane perpendicular to VP inclined at 55° to HP cuts the cylinder and passing through a point on the axis at a height of 45 mm above the base. Draw the isometric projection of the truncated portion of the cylinder such that the cut surface is clearly visible to the observer. (16)

15. a) A square prism of base side 40 mm and height 70 mm rests with its base on the ground such that one of its rectangular faces is parallel and 10 mm behind picture plane. The station point is 30 mm in front of picture plane, 80 mm above the ground plane and lies in a central plan 40 mm to the right of the corner of the prism. Draw the perspective projection of the prism. (16)

(OR)

b) A square pyramid of side of base 50 mm and altitude 70 mm stands on the ground vertically with an edge of base parallel to and 20 mm behind PP. The station point is 40 mm in front of PP and 70 mm above the ground. The central plane is located 45 mm to the left of the axis of the solid. Draw the perspective view of the solid. (16)

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B.E. Degree Examinations – April/May 2022

III & IV Semester (Full Time)

(2018 Regulations)

COMMON TO CIVIL / ELECTRICAL / METALLURGICAL ENGINEERING

18MA302 – Statistics and Numerical Methods

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Find the Mean weight of the following data
   The weights of 8 boys in kilograms: 45, 39, 53, 45, 43, 48, 50, 45.
2. Define Skewness and Kurtosis.
3. What is Type-I and Type-II error?
4. Write two applications of χ^2 test.
5. State the order of convergence and condition for convergence of Newton-Raphson Method.
6. Write Newton's Divided difference formula.
7. Determine the value of y at $x = 0{,}01$ by Euler's Method, given $y' = x + y, y(0) = 1$.
8. Explain in brief Single step methods and Multi step methods.
9. When Bender-Schmidt recurrence equation valid?
10. What is the Explicit formula to solve the one dimensional wave equation? And write the relationship between k and h.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Find the Median for the following frequency distribution. (8)

x :	1	2	3	4	5	6	7	8	9
f:	8	10	11	16	20	25	15	9	6

ii) Fit a straight line fit of the form $y = a + bx$, by the method of group averages for the following data. (8)

x :	0	5	10	15	20	25
y :	12	15	17	22	24	30

(OR)

b) i) Find the best fitting straight line to the data by the method of Least squares. (8)

x :	5	10	15	20	25
y :	15	19	23	26	30

ii) Fit a parabola of the pattern $y = a + bx + cx^2$ of the data given below (8)

x :	20	40	60	80	100	120
y :	5.5	9.1	14.9	22.8	33.3	46.0

12. a) i) Compute the statistic you would use to test whether the following work is meeting the specification. A machinist is making engine parts with axle diameters of 0.700 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a S.D of 0.040 inch. (8)

ii) Apply χ^2 test to test the correctness of the hypothesis that the digits were distributed in the equal number in the tables from which they were chosen. 200 digits were chosen at random from set of tables. The frequencies of the digits were given below. (8)

Digit:	0	1	2	3	4	5	6	7	8	9
Frequency:	18	19	23	21	16	25	22	20	21	15

(OR)

b) i) Examine whether the difference in the variability in yields is significant at 5% level of significance for the following. (8)

	Set of 40 plots	Set of 60 plots
Mean yield per plot	1256	1243
S.D per plot	34	28

ii) Test whether there is any significant difference between the performance of boys and girls. A Mathematics test was given to 50 girls and 75 boys. The girl made an average grade of 76 with a S.D of 6, while boys made an average grade of 82 with a S.D of 2. (8)

13. a) i) Find the real positive root of $3x - cosx - 2 = 0$ by Newton- Raphson method correct to three decimal places. (8)

ii) Find the value of y at $x = 21$ from the following data, using Newton's forward interpolation formula. (8)

x:	20	23	26	29
y:	0.3450	0.3987	0.5384	0.5848

(OR)

b) i) Solve the following system of Equations by Gauss-Seidel method (8)
$8x + y + z = 8$,$2x + 4y + z = 4$,$x + 3y + 3z = 5$.

ii) Find $y(10)$ from the following table, using Lagrange's interpolation formula. (8)

x:	5	6	9	11
y:	10	13	14	18

14. a) i) Compute $y(0.1)$ & $y(0.2)$ by using Taylor's series method, given (8)
$y' = xy + y^2,\ y(0) = 1.$

ii) Compute $y(0.1)$ by using Runge- kutta method of fourth order, given (8)
$y' = x + y,\ y(0) = 1.$

(OR)

b) i) Solve the equation $\frac{dy}{dx} = 1 - 2y, given\ y(0) = 0$, using Modified Euler's method and tabulate the solutions at $x = 0.1\ and\ x = 0.2$. (8)

ii) Determine the value of $y(2)$ using Milne's Predictor and Corrector method, given $\frac{dy}{dx} = \frac{1}{4}(2x + 2y), y(0) = 2,\ y(0.5) = 2.636,\ y(1) = 3.595,$ and $y(1.5) = 4.968$. (8)

15. a) i) Solve $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square mesh with sides $x = 0,\ y = 0,\ x = 3,\ y = 3$ with $u = 0$ on the boundary and mesh length 1 unit. (8)

ii) Solve numerically, $u_{xx} = 2u_t$ with the boundary conditions $u(0,t) = 0,\ u(5,t) = 0$ and $u(x,0) = x^2(25 - x^2)$, assuming $h = 1$ and $k = 1$. Find the value of u up to $t = 5$ by Bender-Schmidt method. (8)

(OR)

b) i) Solve by Crank – Nicholson method the equation $u_{xx} = u_t$ subject to $u(x,0) = 0, u(0,t) = 0$ and $u(1,t) = t$ for two time steps. (8)

ii) Solve numerically, $4u_{xx} = u_{tt}$ with the boundary conditions $u(0,t) = u(4,t) = 0$ and the initial conditions $u_t(x,0) = 0$ and $u(x,0) = x(4 - x)$ by taking $h = 1\ \&\ k = 1/2$ (for 4 time steps). (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CE406 – Concrete Technology

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What are Bogues compounds?
2. List the various tests which are to be done on aggregates.
3. List out the factors affecting workability of concrete.
4. What are the steps adopted to control bleeding?
5. Differentiate nominal mix and design mix.
6. What are the Requirements of concrete mix design as per BIS?
7. Name some of the natural light weight aggregate.
8. Explain fibre reinforced concrete.
9. Classify average design strength and specified minimum strength.
10. What is statistical quality control?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain in detail the test for cement. (16)

(OR)

b) Describe in detail about the importance of the quality of water used for concreting. (16)

12. a) Explain the tests for measurement of workability. (16)

(OR)

b) Explain in detail about the determination of compressive and flexural strength of concrete. (16)

13. a) Design a concrete mix as per Indian Standard for construction of an elevated water tank. (16)

The specified design strength of concrete (characteristic strength) is 30 MPa at 28 days.

Standard deviation can be taken as 4 MPa.

The specific gravity of FA and C.A. are 2.65 and 2.7 respectively.

The fine aggregate is confirming to zone II gradation.

Ordinary Portland cement will be used.

Assume any other essential data.

(OR)

b) What are the Factors affecting the proportioning of concrete mix? (16)

14. a) Explain fibre reinforced concrete. (16)

(OR)

b) Describe in detail about Shotcrete and its advantages. (16)

15. a) Explain the statistical analysis, acceptance and rejection criteria of concrete. (16)

(OR)

b) Analyze the recommendations given in IS 456:2000 for good quality control of concrete. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CS405 – Microprocessors and Microcontrollers

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define stack segment register.
2. Mention any four miscellaneous instructions in 16 bit processor.
3. Classify the I/O programming.
4. Show your understanding on bus request, bus Grant and cycle Stealing.
5. How would you use terminal count register?
6. List the applications of 8251 IC chip.
7. Label the register bank of 8051.
8. Identify the different operand types used in 8051.
9. Distinguish between Timer and Counter.
10. Point out the various types of memory.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Examine the various addressing modes available in 8086. Explain each mode with an example. (16)

(OR)

b) Write an assembly language program for performing the Multiplication and Division of 16 bit numbers using 8086 Microprocessor. (16)

12. a) i) Illustrate all the pin functions of 8086 processor configured in the maximum mode. (12)

ii) Mention the advantages of multiprocessor configurations. (4)

(OR)

b) Assess the various schemes used to solve the bus arbitration problem in multiprocessors. (16)

13. a) i) Demonstrate interfacing an LCD display with 8086 microprocessor. (10)

ii) List the different DMA transfer modes supported by a DMA controller and explain these modes. (6)

(OR)

b) i) Draw the block diagram of traffic light control system using 8086. (8)

ii) Write the algorithm and ALP for traffic light control system. (8)

14. a) i) Write a program to multiply the given number 48H and 30H using 8051. (8)

ii) Tabulate the comparisons of CALL, RET and PUSH, POP instructions. (8)

(OR)

b) i) Compose the functions of the signals present in 8051 with necessary diagrams. (10)

ii) Summarize the features of 16-bit microcontroller. (6)

15. a) i) Analyze how to interface a 16 X 2 LCD display using 8051microcontroller. (8)

ii) Mention the modes of serial communication in 8051. Demonstrate about the setting up of serial port modes. (8)

(OR)

b) Draw the diagram to interface a stepper motor with 8051 microcontroller and explain. Write its ALP to run the stepper motor in both forward and reverse direction with delay. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18EC405 – Control Systems

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Compare closed loop control system with open loop control system.
2. Write Mason's Gain formula.
3. Define settling time.
4. State the effect of PI controller on the system performance.
5. Define gain margin.
6. Enumerate the effects of phase lag and phase lead compensation.
7. State the necessary and sufficient conditions for Routh Hurwitz criterion.
8. State Nyquist Stability Criterion.
9. Define the term state and state variable.
10. What is controllability and observability?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Write the differential equations governing the mechanical systems shown in figure.1, and determine the transfer function X(S)/F(S). (16)

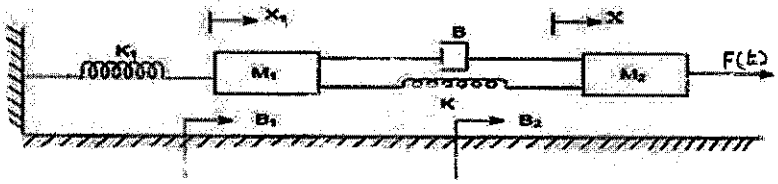

Figure.1.

(OR)

b) Using block diagram reduction technique, find closed loop transfer of the system shown in figure.2. (16)

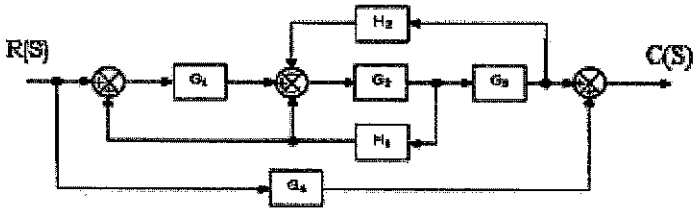

Figure.2.

12. a) The unity feedback system is characterized by an open loop transfer function G(s) = K/s(s+10). Determine the gain K, so that the system will have a damping ratio of 0.5 for the value of K. Also determine settling time, peak overshoot and time to peak overshoot for a unit step input. (16)

(OR)

b) Explain the functions of PI, PD and PID controllers with neat diagram. (16)

13. a) Plot the bode diagram for the following transfer function and obtain the gain and phase crossover frequency. (16)

$$G(s) = \frac{10}{s(1+0.4s)(1+0.1s)}$$

(OR)

b) Describe the procedure for the design of lead- lag compensator using Bode plot. (16)

14. a) Construct routh array and determine stability of system whose characteristics equation is $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$. Also determine the number of roots lying on right half of s-plane, left half of s-plane and on imaginary axis. (16)

(OR)

b) Sketch the root locus of the system with open loop transfer function, $G(s) = \frac{K}{s(s+2)(s+4)}$. (16)

15. a) Formulate the transfer function for the system represented in state space equations. (16)

$$\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{pmatrix} -5 & -1 \\ 3 & -1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + \begin{pmatrix} 2 \\ 5 \end{pmatrix} u$$

$$y = [1 \quad 2] \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$$

(OR)

b) Test whether the following system is completely observable or not. (16)
$\dot{X} = Ax + Bu$ and $Y = Cx$.

Where $x = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$ $A = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{pmatrix}$ $B = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$ $C = [4 \quad 5 \quad 1]$

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B.E. Degree Examinations – April/May 2022

III Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME303 – Refrigeration and Air Conditioning

(Approved steam tables, Psychrometric chart and Refrigeration tables are Permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Draw the P-V and T-S diagram for VCR system with saturated vapour after compression.
2. Name the types of multi-evaporator refrigeration system.
3. What are the types of condensers in refrigerating systems?
4. What do you mean by balancing of refrigeration system?
5. Define bypass factor of cooling coils.
6. Define the term Grand sensible heat factor.
7. List the different sources of heat gains in an enclosed space.
8. Define sensible heat gain and latent heat gain.
9. Name the psychrometric processes involved in winter air-conditioning.
10. What are the functions of a cooling tower?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A refrigerator works between -7° and -27°C. The water vapour is dry at the end of isentropic compression. There is no under cooling, and the expansion is by throttle valve. Find i) COP ii) power of the compressor to remove 175 kJ/min. (10)

ii) Describe with neat sketch working of a regenerative air refrigeration system. (6)

(OR)

b) i) Draw the neat diagram of ammonia- water VAR system and explain the operation of its main components. (12)

ii) List the advantages and disadvantages of ammonia-water VAR system. (4)

12. a) i) Draw and explain any two types of condensers in detail. (12)

ii) List the desired properties of an ideal refrigerant. (4)

(OR)

b) i) Explain the process of ice making with neat sketch and give its applications. (8)

ii) How the domestic refrigeration units are charged and explain the methods of leak testing of refrigerants. (8)

13. a) i) Draw neatly and explain the main processes of summer air conditioning. (12)

ii) Write short notes on human comfort chart. (4)

(OR)

b) i) The atmospheric air at 760 mm of Hg, DBT 15°C and WBT 11°C enters a heating coil, whose temperature is 41°C. Assuming by pass factor of heating coil is 0.5; determine DBT, WBT and RH of the air leaving the coil. Also determine the sensible heat added to the air per kg of dry air. (10)

ii) Discuss the factors affecting optimum effective temperature. (6)

14. a) A restaurant with a capacity of 100 persons is to be air-conditioned with the following data: Outside conditions: 30° DBT and 70% RH, Inside conditions: 23°C DBT and 55% RH. The required condition is to be achieved first by cooling and dehumidifying and then by heating. If 20 m^3 of air is absorbed by the plant every minute, Find, (16)

i) Capacity of the cooling coil in TR

ii) Capacity of heating coil in kW

iii) Amount of water removed per hour.

(OR)

b) i) Explain the operation of a central air-conditioning system with neat sketch. (10)

ii) List out the merits, demerits and applications of central air-conditioning systems. (6)

15. a) i) Describe the following: i) air filters ii) air washers iii) humidifiers iv) dehumidifiers. (8)

ii) Draw and explain any two types of cooling towers with neat diagram. (8)

(OR)

b) i) Explain the operation of air conditioning system used in public buildings with neat sketch. (12)

ii) Discuss the importance of thermal insulation in air conditioning systems. (4)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CSPE804 – Mobile Computing

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Distinguish between mobile computing and wireless networking.
2. List the features of MAC protocols.
3. State the key mechanism in mobile IP.
4. Define route optimization.
5. What is the frequency range of uplink and downlink in GSM network?
6. Name the different interfaces present in UMTS.
7. List the characteristics of mobile adhoc network.
8. Compare broadcasting and multicasting.
9. What are the special constraints of mobile operating systems?
10. Specify the motivation of monolithic kernel OS design.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the distinguishing features of various generations of wireless networks. (12)

ii) Give some applications of mobile computing. (4)

(OR)

b) i) Discuss the various Reservation based schemes in MAC protocol. (12)

ii) List out the issues in MAC. (4)

12. a) i) Why the traditional IP cannot be used in a mobile network? What are the main differences between the traditional IP and the mobile IP? How does mobile IP support mobile hubs? (12)

ii) State any four terminologies associated with mobile IP. (4)

(OR)

b) i) Explore the various improvements in TCP performance with diagram. How does it maintain end to end semantics? (12)

ii) Mention the layers of TCP/IP protocol stack. (4)

13.	a)	i)	Illustrate in detail the system architecture of GSM with neat sketch.	(12)
		ii)	Write brief notes on entities of Operation Sub System (OSS).	(4)
			(OR)	
	b)	i)	Explain the protocol architecture of GPRS with neat representation.	(12)
		ii)	Summarize handoff and its types.	(4)
14.	a)	i)	Demonstrate how routing is done in MANET.	(10)
		ii)	Outline the proactive routing protocols.	(6)
			(OR)	
	b)	i)	Describe the architecture of VANET with neat sketch.	(10)
		ii)	Explore the various routing protocols in VANET.	(6)
15.	a)	i)	Interpret the various components and features of iphone OS.	(12)
		ii)	Discuss important features supported by Symbian operating system.	(4)
			(OR)	
	b)	i)	Illustrate mobile payment systems and various payment schemes.	(12)
		ii)	Compare and contrast various popular mobile Operating Systems.	(4)

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B.E. Degree Examinations – April/May 2022

V Semester (Part Time)

(2012 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

12EC601 – Digital Communication

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention the advantages of Time Division Multiplexing.
2. Differentiate PCM and DPCM.
3. List out the properties of matched filer.
4. Draw the eye pattern for m = 2.
5. Draw the signal space diagram of coherent BPSK system.
6. What is the bit error probability of FSK?
7. For a (8,3) linear block code, calculate the code rate.
8. Mention the properties of cyclic codes
9. Write short notes on PN sequence.
10. Mention any two applications of spread spectrum technique.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Discuss the concept of the delta modulation system and list out the unique features of delta modulation and mention the drawbacks. Suggest a method to overcome the drawbacks. (16)

(OR)

b) Illustrate and describe the types of quantizer and describe the mid tread and mid rise type characteristics of uniform quantizer with suitable diagram. (16)

12. a) Explain how Nyquist criterian eliminates interference in the absence of noise for distortion less base band binary transmission. (16)

(OR)

b) What do you understand by the term ISI? With the baseband binary transmission systems explain ISI. And also brief how the eye pattern illustrates the performance of a data transmission system with respect to ISI with neat sketch (16)

13. a) With suitable block diagram, narrate the generation and reception of coherent Binary FSK modulation with its signal space diagram and bit error probability. (16)

(OR)

b) What is the need for synchronization and Explain the method of carrier synchronization with necessary diagrams? (16)

14. a) Consider a linear block code with generator matrix G, as given below. (16)

$$G = \begin{pmatrix} 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{pmatrix}$$

i) Find the dimension of the code.

ii) Determine the parity check matrix.

iii) Find all the code vectors

iv) Determine the error detecting and correcting capability of the code

v) Calculate the syndrome for the received vector (1 1 0 0 1 0 0 1).

(OR)

b) With an example explain the step by step procedure of the Viterbi decoding algorithm to decode the convolutional codes. (16)

15. a) Discuss the concept of Direct-Sequence Spread Spectrum with coherent Binary PSK system. And list the advantages and applications. (16)

(OR)

b) Explain the concept of Frequency Hop Spread Spectrum. Classify it and Discuss any one method. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CE405 – Applied Hydraulics and Fluid Machinery

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Distinguish between critical, sub-critical and super-critical flows.
2. List the instruments used to measure velocity of open channel flow.
3. State the assumptions made in the derivation of dynamic equation for gradually varied flow.
4. Explain the classification of Hydraulic Jumps.
5. Define Jet Propulsion.
6. How cavitations are formulated in a hydraulic machine?
7. Compare an Impulse Turbine with Reaction Turbine.
8. What is Draft Tube?
9. List the various parts of a Centrifugal Pump with a neat sketch.
10. Explain the work saved by fitting an air vessel in a Double Acting Reciprocating Pump.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A Trapezoidal channel has a bottom width of 6.1 m and side slopes of 2 H: 1 V; with a depth of the flow of 1.07 m. The flow is 10.47 m^3/sec. What is the specific energy of flow? Is the flow being sub critical or super critical? (8)

ii) A rectangular channel carries water at the rate of 400 lit/sec with a bed slope of 1/2000. Determine the most economical dimension of the channel if C = 50. (8)

(OR)

b) i) How do you classify Open Channels? Explain in detail. Also explain the velocity distribution in open channel. (8)

ii) A concrete lined trapezoidal channel N = 0.015 is to have a side slope of 1.0 horizontal to 1 vertical. The bottom slope is to be 0.004. Determine the bottom width of the channel necessary to carry 100 m^3/sec of discharge at a normal depth of 2.50 m. (8)

12. a) i) Derive the dynamic equation for gradually varied flow. (8)

ii) In a hydraulic jump occurring in a rectangular horizontal channel, the discharge per unit width 2.5 $m^3/sec/m$ and the depth before the jump is 0.25 m. Estimate, (8)

i) The sequent depth

ii) Energy loss

iii) Power dissipated per meter width.

(OR)

b) i) How do you classify surface profiles? Briefly explain the various salient features of the various surface profiles. (8)

ii) Hydraulic jump occurring in horizontal rectangular channel, the Froude Number before the Jump is 10.0 and energy loss is 3.2 m Estimate (8)

i) Conjugate depth

ii) Discharge intensity

iii) Froude Number after the jump.

13. a) i) Derive an expression for the hydro dynamic force when a liquid jet exerts on a series of moving vanes at center. Also determine the efficiency of the jet. (8)

ii) A jet of water 250 mm in diameter impinges normally on a flat plate moving at 2 m/sec in the same direction as that of jet. If the discharge is 0.50 m^3/sec. Determine the force exerted by the jet on the plate. Also determine the work done on the plate per second. (8)

(OR)

b) i) Explain the hydro dynamic force and Angular Momentum principle. (8)

ii) A jet of water of diameter 150 mm strikes a flat plate normally with a velocity of 12 m/sec. The plate is moving with a velocity of 6 m/sec in the direction of the jet and away from the jet. Determine (8)

i) The force excerted by the jet on the plate

ii) Work done by the jet on the plate per second

iii) Power of the jet

iv) Efficiency of the jet.

14. a) i) Explain the various classifications of Turbines. (8)

ii) Design a Pelton turbine to develop a power of 100 KW under a head of 60 m while running at 200 rpm. Assume speed ratio as 0.45, coefficient of velocity as 0.98 and overall efficiency as 0.85. (8)

(OR)

b) i) Explain briefly about the working principle of Pelton Wheel with neat sketch. (8)

ii) Design a Kaplan Turbine to develop 9100 KW. The net head is 5.6 m, speed ratio is 2.09, flow ratio is 0.68 and overall efficiency 86%. The diameter of boss is 1/3 of the runner. Determine the diameter of runner and its speed. (8)

15. a) i) The impeller of a Centrifugal Pump is having external and internal diameters 500 mm and 250 mm respectively, width at outlet 50 mm and running at 1200rpm. It works against a head of 48 m. The velocity of flow through the impeller is constant and equal to 3 m/sec. The vanes are set back at an angle of 40° at outlet. Determine (8)

i) Inlet vane angle

ii) Work done by the impeller and manometric efficiency.

ii) What is meant by Reciprocating Pumps? Explain the walking principle in detail with a sketch. (8)

(OR)

b) i) Draw and explain about velocity triangle for the Centrifugal Pump. (8)

ii) A single acting Reciprocating Pump having a cylinder diameter of 100 mm and stroke of 200 mm is used to raise the water through a height of 15 m. Its crank rotates at 50 rpm. Determine the theoretical power required to run the pump and the theoretical discharge. If actual discharge is 5 litre/sec, determine the percentage of slip. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CS404 – Software Engineering

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the process framework and Umbrella activities.
2. If you have to develop a word processing software product, what process model will you choose? Justify your Answer.
3. What do you mean by functional and non-functional requirements?
4. How are the requirements validated?
5. Draw diagrams to demonstrate the architectural styles.
6. What are the architectural styles are preferred for the following systems? Why?
   i) Networking
   ii) Web based systems
   iii) Banking system.
7. List out some of the good coding practices.
8. How will you test a simple loop?
9. Distinguish between Verification and Validation.
10. Mr. Rahul is the project manager on a project to build a new cricket stadium in Delhi, India. After six months of work, the project is 27% complete. At the start of the project, Rahul estimated that it would cost Rs.35,00,000, What is the Earned Value?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain in detail about Specialized Process Models (16)
    i) Component Based Development Model
    ii) Aspect-Oriented Software Development Model.

(OR)

    b) Explain in detail about Personal and Team Process Model. (16)

12. a) Explain the software requirement engineering process with neat diagram. (16)

(OR)

    b) Analysis Data Modeling Concepts with ATM real time example. (16)

13. a) What is software architecture? Describe the different software architectural styles with examples. (16)

(OR)

b) What is structured design? Illustrate the structured design process from DFD to structured chart for Safe Home Security Function. (16)

14. a) Describe the various Black box and White box testing techniques. Use suitable examples for your explanation. (16)

(OR)

b) Discuss about the various Integration and Debugging strategies followed in Software Development. (16)

15. a) Describe in detail COCOMO model for software cost estimation. Use it to estimate the effort required to build software for a simple ATM that produces 12 screens, 10 reports and has 80 software components. Assume average complexity and average developer maturity. Use application composition model with object points. (16)

(OR)

b) i) Create a decision tree to support the make/buy decision with neat diagram. (10)

ii) Discuss about the metrics for small organizations. (6)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18EC404 – Analog Communication

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Modulation index for an AM wave.
2. List the advantages of single side band transmission.
3. Differentiate phase and frequency modulation.
4. State Carson rule.
5. Define noise figure.
6. What is power spectral density of white noise?
7. Define capture effect.
8. State the need for pre-emphasis in FM Receivers.
9. Write the importance of entropy.
10. State Shannon's theorem.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Describe the generation of AM wave using square law modulator with mathematical analysis. (8)

ii) With neat block diagram explain the generation of VSB wave by phase discrimination method. (8)

(OR)

b) i) Demonstrate the process of frequency translation in communication with a block diagram. (6)

ii) Discuss in detail the working of AM super hetrodyne receiver. (10)

12. a) Elucidate the generation of narrow band and wideband frequency modulated wave with neat sketch. (16)

(OR)

b) i) Explain demodulation of FM signals using PLL. (8)

ii) A 93.2MHz carrier is frequency modulated by a 5 KHz sine wave. The resultant FM signal has a frequency deviation of 40KHz. (8)

1. Find the carrier swing of the FM signal.
2. What are the highest and lowest frequencies attained by the frequency modulated signal?
3. Calculate the modulation index for the wave.

13. a) Describe the following: (16)

1. Shot noise
2. Thermal noise
3. White noise
4. Noise temperature.

(OR)

b) Demonstrate in detail about the effect of noise in DSB-SC and SSB receivers. (16)

14. a) Illustrate in detail the effect of noise in FM receivers. (16)

(OR)

b) i) Describe in detail the pre-emphasis and de-emphasis in FM. (8)

ii) Derive the techniques to minimize the threshold effects in AM receivers. (8)

15. a) i) Derive the expression for the channel capacity of a binary symmetric channel. (10)

ii) Explain about joint entropy and conditional entropy. (6)

(OR)

b) Consider a source with eight alphabets A to H with respective probabilities of 0.22, 0.20, 0.18, 0.15, 0.10, 0.08, 0.05 and 0.02. Construct Huffman's code and estimate its efficiency. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18ME405 – Materials Engineering

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention the significance of Isomorphous system.
2. Comment on the crystal structure and magnetic property of Austenite.
3. Specify the importance of Critical Cooling Rate (CCR).
4. State the principle of Induction hardening process.
5. What is PSZ? Mention its major applications.
6. List any two defects of Ceramics.
7. Define the term 'Creep'.
8. Why should brittle failure to be avoided in engineering applications?
9. Differentiate between destructive testing and non-destructive testing.
10. What is Contact mechanics?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Give a note on Substitutional and Interstitial solid solutions with neat sketches. (8)

ii) Draw the Iron-Iron carbide equilibrium diagram and mark the phases. Write the Eutectoid and Eutectic reactions of Iron-Carbon system. (8)

(OR)

b) i) Discuss in detail the effect of alloying additions on properties of steels. (8)

ii) Give the chemical composition, draw the microstructure and discuss the properties and applications of Grey cast iron and Spheroidal Graphite iron. (8)

12. a) i) Briefly explain the Normalizing treatment on plain carbon steels. (8)

ii) Enumerate the Jominy end quench test for determining hardenability. (8)

(OR)

b) i) With a neat sketch, describe the method of Pack carburizing. (8)

ii) With the help of required portion of Aluminium-Copper phase diagram, discuss the precipitation hardening treatment of Duralumin. (8)

13. a) i) Discuss in detail the properties and applications of Al_2O_3 and SiC. (8)

ii) Explain the Air Plasma Spray coating process and mention the advantages. (8)

(OR)

b) i) Enumerate the steps in a typical CVD technique. (8)

ii) Write short notes on Fibre reinforced composites. (8)

14. a) i) With necessary sketches, explain the stages in ductile failure of a moderately ductile material. (8)

ii) Describe the procedure for Fatigue testing of round specimen. (8)

(OR)

b) i) Explain Brinell hardness testing method with a neat sketch. (8)

ii) Give an account on Charpy V-notch impact test. (8)

15. a) Discuss the principle, procedure, advantages, limitations and applications of Magnetic Particle Inspection. (16)

(OR)

b) With necessary sketches, describe the procedure for Ultrasonic testing. State its advantages, limitations and applications. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18ME408 – Engineering Mechanics

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State Lame's theorem.
2. Write the conditions for equilibrium for a particle in space.
3. List any four types of supports.
4. State Varignon's theorem.
5. Determine the centroid of the rectangle lamina 60 mm × 25 mm.
6. Distinguish between centroid and center of gravity.
7. Define coefficient of friction and express its relationship with angle of friction.
8. List the different types of friction. Write the equation of coefficient of static friction.
9. What do you understand by the term kinematics?
10. State law of conservation of momentum.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) A system of four forces acting on a body is shown in Figure.1. Determine the resultant force and its direction. (16)

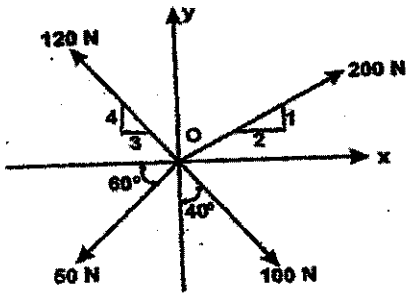

Figure.1.

(OR)

b) A string ABCD, attached to fixed points A and D has two equal weights of 1000 N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in Figure.2. Find the tensions in the portions AB, BC and CD of the string, if the inclination of the portion BC with the vertical is 120°. (16)

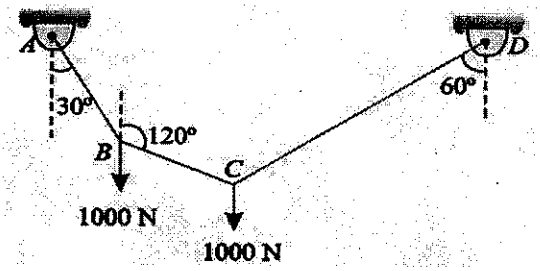

Figure.2.

12. a) Find the resultant moment at corner B shown in Figure.3. (16)

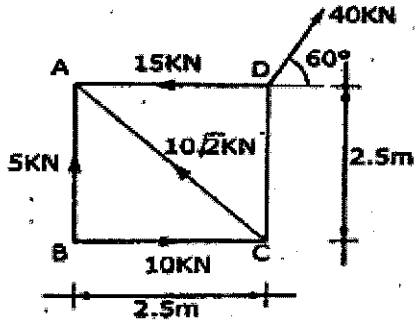

Figure.3.

(OR)

b) Determine the support reactions of the simply supported beam as shown in Figure.4. (16)

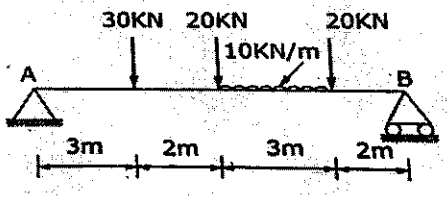

Figure.4.

13. a) Locate the centroid of the section shown in Figure.5. (16)

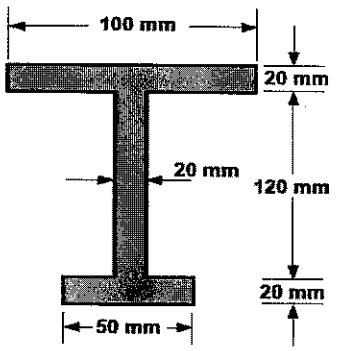

Figure.5.

(OR)

b) Find the moments of inertia of the channel section in Figure.6. about its centroidal axes XX. (16)

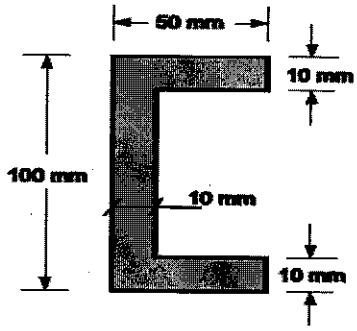

Figure.6.

14. a) An effort of 300 N is required just to move a certain body up an inclined plane of angle 15° the force acting parallel to the plane. If the angle of inclination of the plane is made 20° the effort required, again applied parallel to the plane, is found to be 230 N. Find the weight of the body and the coefficient of friction. (16)

(OR)

b) A body of mass 150 kg rests on an inclined plane that is 30° to the horizontal as shown in Figure.7. The angle of static friction between the body and the plane is 15°. What horizontal force P is necessary to hold the body from sliding down the plane? (16)

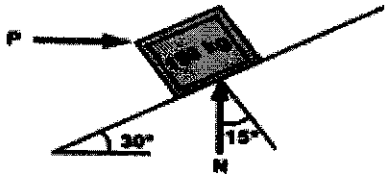

Figure.7.

15. a) A block and pully system as shown in Figure.8. The horizontal plane and the pully are frictionless. Determine the acceleration of the blocks and the tension in the cable when the system starts from rest. Use principles of impulse and momentum. (16)

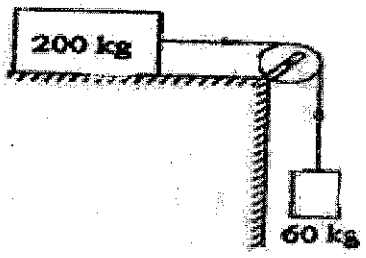

Figure.8.

(OR)

b) A mass of 10 kg travelling towards right with a speed of 25 m/s collides with another mass 20 kg travelling in the same direction with a speed of 9 m/s. If the coefficient of restitution is 0.6, find the velocities of masses after collision and loss of kinetic energy. What is the impulse of either mass? (16)

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B.E. Degree Examinations – April/May 2022

III & IV Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING/METALLURGICAL ENGINEERING

18CY301 – Biology for Engineers

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define glycosidic linkage.
2. Infer the amphoteric nature of amino acids.
3. Deduct the reason for the denaturation of enzyme 100°C.
4. Formulate the name of the enzyme from the following substrates upon which the enzyme acts i) Sucrose ii) Fat iii) Fumaric acid iv) Protein.
5. Classify the proteins based on the nutritional value.
6. Contrast tertiary and quaternary structure of proteins.
7. Define exergonic reaction and endergonic reaction.
8. Summarize the external factors which affect photosynthesis.
9. Recall structural components of DNA and RNA.
10. Develop a corresponding RNA sequence for the given single strand DNA. GCATCGATTGAGCTCTAGCG.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Outline the sources, function and deficiency disease of water-soluble vitamins along with their structures. (16)

(OR)

b) i) Recall the structure of fructose and sucrose with proper explanation. (8)

ii) Build the appropriate equation for the reaction of alanine with acetic anhydride, formaldehyde, hydrazine and carbon-di-oxide. (8)

12. a) i) Analyze the important factors affecting rate of enzyme reaction. (8)

ii) Interpret the lock and key mechanism of enzyme action. (8)

(OR)

b) Interpret the derivation of Michaelis-Menten equation. (16)

13. a) i) Classify the protein based on the location I the living cells and post-translational modification. (8)

ii) List the important physical properties of proteins. (8)

(OR)

b) i) Explain the various types of bonds and forces found in proteins. (8)

ii) Organize the steps involved in protein synthesis. (8)

14. a) Explain the reactions involved in the Glycolysis. (16)

(OR)

b) i) Distinguish exothermic and endothermic reactions. (8)

ii) Define Gibbs free energy and standard Gibbs free energy. Show the relationship between standard Gibbs free energy and equilibrium constant. (8)

15. a) i) Construct the structure of the following nucleosides. (8)

i) Adenosine

ii) Deoxycytidine

iii) 5-methyluridine

iv) Guanosine.

ii) Contrast Deoxyribonucleic acid and Ribonucleicacid. (8)

(OR)

b) i) Describe the types of RNA. (8)

ii) Organise the table of genetic codes. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCEE01 – Irrigation Engineering

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State the necessity for Irrigation.
2. Define Permanent Wilting Point.
3. What is Exchangeable Sodium Percentage (ESP)?
4. Define Base period.
5. State the advantages of Sprinkler Irrigation.
6. Define Water Conveyance efficiency.
7. State the drawbacks in Kennedy's Theory.
8. Where are Canal Drops constructed in Canals?
9. A tile drainage system draining 12 hectares flows at a design capacity for 2 days following a storm. The Drainage coefficient is 1.25 cm. Determine the quantity of water removed during this period.
10. What are the advantages of Water Users Association?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What are the advantages and disadvantages of Irrigation? Explain. (8)

ii) A crop is grown in a command area of 3000 ha irrigated by a canal. (8)
The data pertaining to irrigation is as follows

Field Capacity of soil – 26%

Optimum moisture – 12%

Permanent Wilting point – 10%

Effective Root zone depth – 80 cm

Relative Density of soil – 1.4

If the frequency of irrigation is 10 days and the overall efficiency is 23%, determine the daily consumptive use and the discharge in the canal.

(OR)

b) i) What are the types of Irrigation Systems? Explain. (8)

ii) After how many days will you supply water to soil (clay loam) in order to ensure efficient irrigation of the given crop if (8)

Field capacity of soil – 27%

Permanent Wilting point – 14%

Dry density of soil – 15 kN/m^3

Effective Root zone depth – 75 cm

Daily consumptive use of the crop – 11 mm.

12. a) i) What are the factors affecting Consumptive Use of water? Explain. (8)

ii) How do you compute consumptive use of crop using Blaney-criddle method? Explain. (8)

(OR)

b) i) What are the different methods of improving duty? Discuss. (8)

ii) The left branch canal carrying a discharge of 20 cumecs has culturable command area of 20,000 ha. The intensity of Rabi crop is 80% and the base period if 120 days. The right branch canal carrying a discharge of 8 cumecs has culturable command area of 12,000 ha. The intensity of irrigation or Rabi crop is 50% and the base period is 120 days. Compare the efficiencies of the two canal systems. (8)

13. a) i) Explain briefly about Border Strip flooding with sketch. (8)

ii) Discuss briefly about Subsurface irrigation method. (8)

(OR)

b) i) Describe briefly about Drip Irrigation and its advantages and disadvantages. (8)

ii) What are the advantages of Furrow irrigation? Discuss. (8)

14. a) i) What are the component parts of Diversion Headwork? Explain. (8)

ii) Design an irrigation channel in alluvial soil according to Lacey's Theory for the following data. Also determine the maximum discharge which can be allowed to flow in the channel. (8)

Bed Slope of the channel – 1 /5000

Lacey`s silt factor – 0.90

Channel side slopes - ½:1

(OR)

b) i) Explain briefly about Aqueduct with diagram. (8)

ii) How do you measure rate of flow using Parshall Flume? Explain. (8)

15. a) i) What are the different layouts of Tile Drains? Explain. (8)

ii) In a tile drainage system, the drains are laid with their centres 1.5 m below the ground level. The impervious layer is 9 m below the ground level and the average annual rainfall in the area is 80 cm. If !% of the annual rainfall is to be drained in 24 hours to keep the highest position of water table to 1 m below ground level, determine the spacing of the drain pipes. The coefficient of permeability is 1 m/s. (8)

(OR)

b) i) How do you reclaim Saline and Alkali soils? Explain. (8)

ii) Write short notes on Warabandhi. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MT604 – Welding Processes and Metallurgy

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What do the digits in the AWS classification of E7018 indicate?
2. How do you obtain 'self-regulating arc' in Gas Metal Arc Welding process?
3. State the principle of Ultrasonic welding process.
4. Name the types of laser used in Laser Beam Welding process.
5. Give the major advantages and limitations of Torch brazing.
6. What are the main objectives of Surfacing?
7. Mention the uses of slag formation during fusion welding.
8. Define the term 'Weldability' according to AWS.
9. Arrange the four types of cast iron in the order of decreasing weldability (i.e., good to poor).
10. List the major weldability issues in welding of Aluminium and its alloys.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Describe the equipment setup, principle, merits and demerits of Oxy-acetylene welding process. (8)

ii) Write short notes on (8)

a) Functions of flux covering in Shielded Metal Arc Welding process.

b) Any two modes of metal transfer in Gas Metal Arc Welding process.

(OR)

b) i) Explain the principle of Submerged Arc Welding process with its merits, demerits and applications. (8)

ii) Describe in detail the principle of Resistance Spot Welding process. (8)

12. a) i) Enumerate the principle, merits and demerits of Friction Stir Welding process. (8)

ii) List the common explosives used in Explosive Welding and explain the principle of the process. (8)

(OR)

b) i) Describe the equipment setup, principle, merits and demerits of Electron Beam Welding process. (8)

ii) Explain the principle of Plasma Arc Welding process in transferred arc mode and state the merits of the process compared to Gas Tungsten Arc Welding. (8)

13. a) i) Enumerate the principle of Dip brazing process. (8)

ii) Give an account on Wave soldering technique. (8)

(OR)

b) i) Explain the principle of Chemical flux cutting process. (8)

ii) Describe the principle of Submerged arc surfacing with strip electrode. (8)

14. a) i) Give a detailed account on heat flow and weld thermal cycles during fusion welding. (8)

ii) Quenched & Tempered steel (tempered at 430°C) plates of 12 mm thick are arc welded with 20 V, 220 A and welding speed of 4 mm/s. Determine the width of the HAZ when the plates are welded under the following welding conditions: i) with a preheating temperature of 150°C, ii) with a preheating temperature of 225°C, iii) with a preheating temperature of 300°C. (8)

Data: Heat transfer efficiency= 0.9; $\rho c = 0.0044$ J/mm^3; $T_m = 1510$°C.

(OR)

b) i) With the help of Iron-Carbon equilibrium diagram, describe the different microstructural zones in arc welded low carbon steel weldment. (8)

ii) Describe the Varestraint test for evaluating the susceptibility to hot cracking. (8)

15. a) i) Explain the mechanism of Hydrogen Induced Cracking (HIC). Discuss the factors responsible for the occurrence of HIC and methods to avoid cracking. (8)

ii) Discuss the major metallurgical difficulties in welding of Austenitic Stainless Steels and their remedial measures. (8)

(OR)

b) i) How is dilution calculated in butt welding of plates? Discuss the weldability issues during dissimilar welding and suggest the remedial methods. (8)

ii) Write notes on any four types of defects in arc welded parts, their causes and remedies. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE403 – Structural Analysis - II

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State Muller-Breslau Principle.
2. Define Castingliano's second theorem.
3. Write the slope deflection equation of combining all the effects.
4. Mention any three reasons due to which sway may occur in portal frames.
5. Define distribution factor.
6. Define stiffness factor and relative stiffness.
7. Why is flexibility method also called as compatibility method or force method?
8. Define the force transformation matrix.
9. What is the basic aim of stiffness method?
10. Write down the equation of element stiffness matrix as applied to 2D plane element.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Draw the influence line for M_B of the continuous beam ABC simply supported at A & C using Muller Breslau's principle. AB = 3 m, BC = 4 m. EI is constant. (8)

ii) Analyse the truss shown if figure.1. AE = constant. (8)

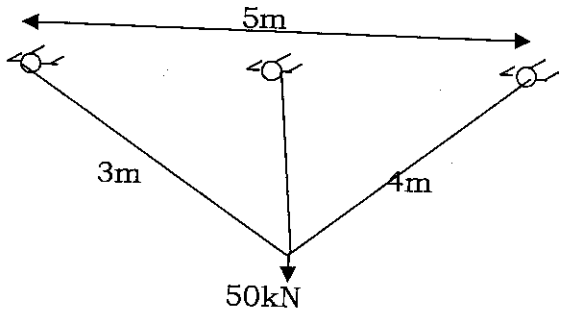

Figure.1.

(OR)

b) i) Briefly explain about Principles of Superposition. (8)

ii) Discuss briefly about Clark Maxwells theorem of reciprocal deflection. (8)

12. a) Determine the Fixed end moment, Slope deflection equation and equilibrium equations for given continuous beam by slope and deflection method. (16)

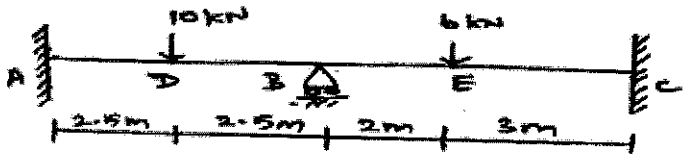

Figure.2.

(OR)

b) Determine the Fixed end moment, Slope deflection equation and equilibrium equations of the portal frame shown. In figure.3 EI is 8000 kNm² throughout. (16)

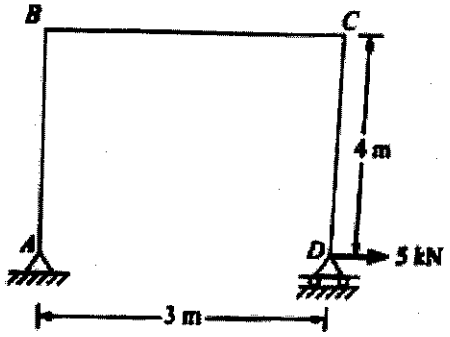

Figure.3.

13. a) Find the Fixed end moment and distribution factor for the given continuous beam. (16)

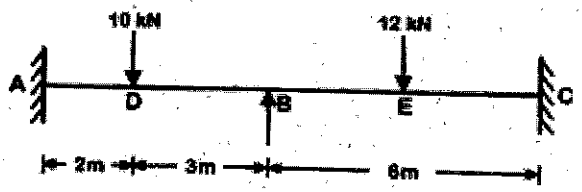

Figure.4.

(OR)

b) Find the Fixed end moment and distribution factor for the given portal frame. (16)

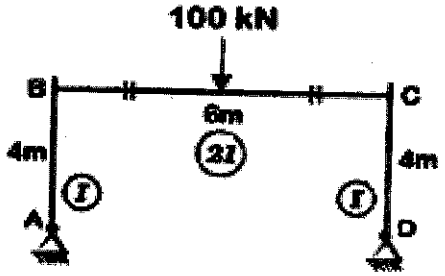

Figure.5.

14. a) For the beam and loading shown, calculate the fixed end moment, Equivalent joint load and Flexibility Coefficient matrix. Take E = 210 Gpa = 210 x 10^9N/m^2, I = 6 x$10^{-6}m^4$. (16)

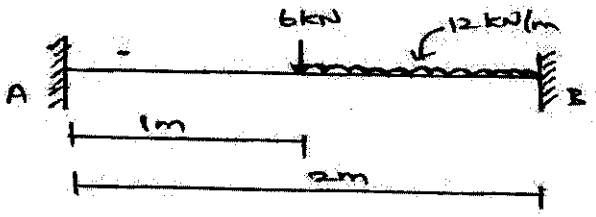

Figure.6.

(OR)

b) For the three bar truss shown in figure.7. determine the degree of redundancy, Flexibility Co-efficient matrix. Take modulus of elasticity as 200Gpa. (16)

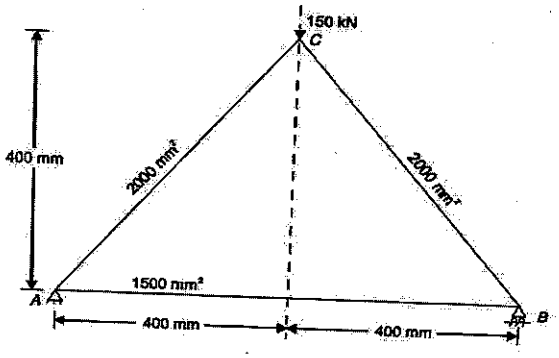

Figure.7.

15. a) Determine Fixed End moments, Formation matrix and Assemblage of global Stiffness Matrix for the given beam. (16)

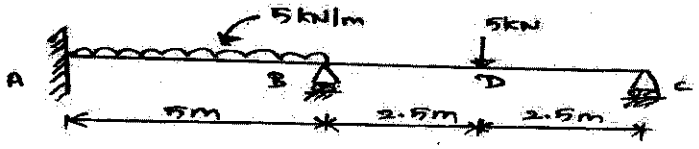

Figure.8.

(OR)

b) Determine Fixed End moments, Formation matrix and Assemblage of global Stiffness Matrix for the given portal frame. (16)

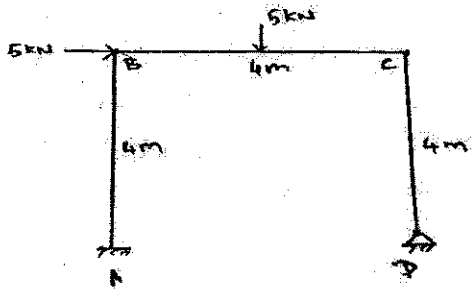

Figure.9.

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE403 – Digital Logic Circuits

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List the advantages of ECL as compared to TTL logic family.
2. Prove that $x \oplus y = x'y + xy'$.
3. Give the design steps for combinational logic circuits.
4. Justify how a decoder can be used as ad multiplexer?
5. Give any two applications of a multiplexer.
6. Name any two random access memory devices.
7. Convert T flip flop into a D flip-flop.
8. Compare Moore and Mealy models of synchronous logic circuits.
9. What is meant by primitive flow table?
10. What are the types of asynchronous sequential circuits?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Minimize the following Boolean function using Karnaugh map. $F(A,B,C,D) = \sum m\,(0,5,7,8,9,10,11,14,15) + \sum d\,(1,4,13)$. (10)

ii) Explain the circuit operation of a CMOS NOR gate. (6)

(OR)

b) i) Minimize the following Boolean function using Quine McCluskey method. $F(W,X,Y,Z) = \sum m\,(0,1,2,8,10,11,14,15)$. (10)

ii) State and Prove De-Morgan's theorem. (6)

12. a) i) Design a full-adder and implement it using logic gates. (8)

ii) Explain how a full subtractor can be built using two half subtractors and a OR-gate. (8)

(OR)

b) i) Design a carry look ahead adder with necessary logic diagram. (8)

ii) Draw the logic diagram of a 4-bit parallel adder/subtractor using full adders and explain. (8)

13. a) i) Design combinational logic circuits that convert BCD code in to Excess-3 code. (8)

ii) Implement the following Boolean function using a 4×1 line multiplexer. $F(W,X,Y,Z) = \sum m(0,1,2,4,6,9,12,14)$. (8)

(OR)

b) i) Design a 4×2 priority encoder using logic gates. (8)

ii) Give the PLA table to implement the following equations: (8)

$X = ABD + A'C' + BC + C'D'$

$Y = A'C' + AD + C'D'$

$Z = CD + A'C' + AD + AB'D.$

14. a) i) Derive the state table and state diagram of the sequential circuit shown in Figure.1. Explain the function that the circuit performs. (8)

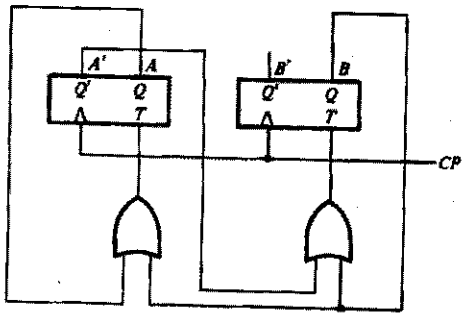

Figure.1.

ii) Draw the circuit of a SR flip-flop and explain its operation. (8)

(OR)

b) i) Design a synchronous counter with the following repeated binary sequence: 0, 1, 2, 4, 6. Use D flip-flops. (8)

ii) Explain the operation of a 3-bit Universal shift register. (8)

15. a) For the asynchronous sequential circuit shown in Figure.2: (16)

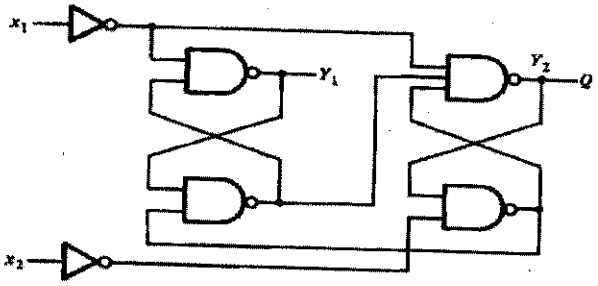

Figure.2.

Derive the transition table, output map and Boolean functions for the outputs of the two SR latches Y_1 and Y_2. Note that the S input of the second latch is $x_1'y_1'$.

(OR)

b) Design an asynchronous sequential circuit with two inputs x_1 and x_2, and one output, Z. Initially, both inputs and output are equal to 0. When x_1 or x_2, becomes 1, Z becomes 1.When the second input also becomes 1, the output changes to 0.The output stays at 0 until the circuit goes back to the initial state. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME403 – Design of Transmission Systems

(Approved PSG Design Data Book is permitted during the Examination)

Time : 3 Hours Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. State the significance of crowning of belt pulleys.
2. What is chordal action (Polygonal action) in chain drive?
3. Mention the reason, why dedendum is more than addendum?
4. Label: a) Addendum b) Flank in a simple sketch of gear tooth.
5. State true or false and justify.
   "Miter gears are used for connecting non-intersecting shafts".
6. A pair of worm gears is designated as 2/54/10/5. Find the gear ratio.
7. Distinguish between structural diagram and ray diagram.
8. State the reason why is the nut of power screw is made of soft material.
9. What is jerk? Name the profile of the cam that gives no jerk.
10. Give the reason for left and right shoes of internal expansion brakes having different actuating forces.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) A roller chain drive is used between a driver shaft running at 1440 rpm and a driven shaft running approximately at 720 rpm. The power transmitted is 15 kW. The drive is to be used for 2 shifts / day with 8 hours / shift. The centre distance is approximately 1000 mm and the chain tension can be adjusted by moving the motor in the rails. Design the drive. (16)

(OR)

b) Two shafts whose centers are 1 meter apart are connected by a V – belt drive. The driving pulley is supplied with 95 kW power and has an effective diameter of 300 mm. It runs at 1000 rpm, while the driven pulley runs at 375 rpm. The angle of groove on the pulleys is 40°. Permissible tension in 400 mm^2 cross – sectional area belt is 2.1 MPa. The material of the belt has density of 1100 kg/ mm^3. The driven pulley is overhung, the distance of the centre from the nearest bearing being 200 mm. The coefficient of friction between belt and pulley rim is 0.28. Design and Estimate the number of belts required. (16)

12. a) For a crane hoist with intermittent operation in a mine, two cylindrical gears are to be rated @ 12 kW at a pinion speed of 1440 rpm. Design the gear pair of the following specifications and draw the arrangement gear ratio = 3.5, pressure angle = 20°. Gear should be made of heat-treated steel. Each gear is expected to work 4 hours a day for 10 years. (16)

(OR)

b) A pair of helical gears subjected to moderate shock loading is to transmit 37.5 kW. At 1750 rpm of the pinion. The speed reduction ratio is 4.25 and the helix angle is 15°. The service is continuous and the teeth are 20° FD in the normal plane. Design the gears, assuming a life of 10,000 Hrs. (16)

13. a) A 1 kW motor running at 1200 rpm drives a compressor at 780 rpm through a 90° bevel gearing arrangement. The pinion has 30 teeth. The pressure angle of the teeth is 20°. Both the pinion and gear are made of heat treated cast iron grade 35. Design the bevel gear. (16)

(OR)

b) Design a worm gear drive to transmit a power of 22.5 kW. The worm speed is 1440 rpm and the speed of the wheel is 60 rpm. The drive should have a minimum efficiency of 80% and above. Select suitable materials for the worm and the wheel and decide upon the dimensions of the drive. (16)

14. a) In a milling machine, 18 different speeds in the range of 35 rpm and 650 rpm are required. Design a three stage gear box with a standard step ratio. Sketch the ray diagram and layout of the gear box, indicating the number of teeth on each gear. The gear box receives 3.6 kW from an electric motor running at 1440 rpm. (16)

(OR)

b) The lead screw of a lathe must exert an axial load of 7500 N in order to drive the tool carriage. The thrust is carried on a collar 60 mm outside diameter and 40 mm inside diameter and the lead screw rotates at 30 rpm. Lead of the screw is 6 mm and the stroke required is 1200 mm. Select the Suitable materials for screw and nut. Design the Suitable drive and determine the power requirements. (16)

15. a) Design a cam for operating the exhaust valve of an oil engine. It is required to give equal uniform acceleration and retardation during opening and closing of the valve, each of which corresponding to 60° of cam rotation. The valve should remain in the fully open position for 20° of cam rotation. The lift of the valve is 37.5 mm and the least radius of the cam is 50 mm, the follower is provided with a roller of 50 mm diameter and its line of stroke passes through the axis of the cam. (16)

(OR)

b) A leather faced conical clutch has cone angle of 30 degree. The pressure between the contact surfaces is limited to 0.35 N/mm^2 and breadth of the conical surface is not to exceed 1/3 of the mean radius. Find the dimensions of the contact surfaces to transmit 22 KW at 2000 rpm. Also calculate the force required to engage and disengage the clutch. Take coefficient of friction as 0.15. (16)

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B.E. Degree Examinations – April/May 2022

III Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18EN301 – Effective Technical Communication

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is the Technical writing?
2. What is a the difference between project report and event report?
3. What are the salient features in Technical articles?
4. Write a note on Newsletters.
5. What is progress report?
6. Write on any two punctuations.
7. Define phrasal verbs.
8. Write any two Telephone etiquettes.
9. What is the difference between a short term goal and a long term goal?
10. Write a note on official notes.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Write a short note on 'Business letter'. (8)

ii) Explain any five Do's and Don'ts in Interviews. (8)

(OR)

b) i) Write a short note on personal goal setting. (8)

ii) Write a brief note on characteristics of Report writing. (8)

12. a) i) Explain career planning. (8)

ii) Write a brief note on self-development and assessment. (8)

(OR)

b) i) Write a brief note on characteristics of Technical writing. (8)

ii) Write a brief note on Minutes of meeting. (8)

13. a) i) Explain E-Mail etiquettes. (8)

ii) Write a brief note on Group discussion. (8)

(OR)

b) i) Write a short note on speaking on Technical topics. (8)

ii) Explain 'power point presentations'. (8)

14. a) i) Fill in using prepositions: (8)

Scientists _____ Britain are using artificial intelligence to create the world's first thinking car wheel. Currently _____ development in a partnership _____ the University of Portsmouth and a Hampshire based company, the 'smart' wheel _____ its artificial intelligence systems is being tested _____ the company's prototype Mini: an eco-friendly electric super car.

Artificial intelligence controls the suspension, steering and breaking systems, teaching it to adapt _____ bends in the road, potholes and other potential hazards. The information collected _____ the car's wheels is retained in the computer's memory and used the next time the car encounters similar road conditions.

ii) Fill in using prepositions: (8)

One night a man dreamed that he was walking _____ the beach _____ the Lord. Many scenes _____ his life flashed _____ the sky. In each scene he noticed footprints _____ the sand. Sometimes there were two sets of footprints. _____ other times there were only one set of footprints. This bothered him very much because he noticed that during the toughest phases _____ his life – that is when he suffered ___ anguish, sorrow, or defeat–he could see only one set of footprints.

(OR)

b) i) Choose the given phrasal verbs and fill in the following: (8)

(up to up for of/for on/upon out up on)

1. The college authorities finally decided to act _____ the barrage of complaints they had received on the noise pollution from the construction sites in the campus.
2. For our presentation on drug abuse among college students, we decided to act _____ a small skit.
3. Jon thinks his larynx is acting _____ again.
4. The costume change in the middle of the performance was a last-minute add _____.
5. All the metrics shown on the screen, did not add _____ a hundred percent.
6. When we added _____ the individual flight and hotel costs, it turned out to be far cheaper than what we had been quoted.
7. We needed to allow _____ a gap of a couple of hours between the flights.
8. The rules for admission are very strict and do not allow _____ any exceptions.

ii) (Back for. about around over/around/round for for out) (8)

1. As children, we were taught never to answer _____ to our teachers, when being told off.
2. Someone needs to answer _____ the complete lack of care the nursing staff provide.
3. At the hospital, they asked me _____ my family's health history.
4. As the maps did not detail out small streets, we had to ask _____ for directions.
5. The first week, we asked our neighbours _____ for some tea.
6. If you drive on the wrong side of the road, you are asking _____ trouble.
7. At the start of the meeting, I asked everyone _____ a moment to think about the objectives.
8. I always meant to ask Indira _____ for dinner, but could never muster the courage.

15. a) i) Elaborate on any five Do's and Don'ts in project presentations. (8)

ii) Write a short note on project review. (8)

(OR)

b) i) Explain 'Defending opinions'. (8)

ii) Explain different type of tenses with examples. (8)

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B.E. Degree Examinations – April/May 2022

VII Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MTE55 – Additive Manufacturing

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention the uses of Additive manufacturing.
2. What is Reverse Engineering?
3. List the applications of 3-D printing.
4. State the principle of Direct Metal Deposition.
5. What is Photo polymerization?
6. Name the metals used in Selective Laser Sintering.
7. List any four applications of Additive Manufacturing in medical sector.
8. What is the need for CATE?
9. List the important properties required in a material for aerospace applications.
10. What are the various applications of Additive Manufacturing in aerospace industries?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Analyze the need for Additive manufacturing in detail with a suitable example. (8)

ii) Explain the stages involved in Computer Aided Design. (8)

(OR)

b) i) Write short notes on Additive Manufacturing tooling. (8)

ii) Differentiate between Computer Aided Manufacturing and Additive Manufacturing. (8)

12. a) i) Explain the critical factors that influence the performance and functions of Selective Laser Sintering and 3-Dimentional printing. (8)

ii) What are features of LOM process? Describe the process flow of LOM process. List out the practical applications. (8)

(OR)

b) i) Explain the principle, process, advantages and applications of Direct Metal Deposition. (8)

ii) Discuss the principles of three dimensional printing process using a case study. (8)

13. a) i) Discuss the Polymer processing techniques with neat sketches. (8)

ii) Elaborate on the various metals used in DMD and SLS processes. (8)

(OR)

b) i) Explain the principle, construction and working operation of any one rapid solidification process. (8)

ii) What is Laser Chemical Vapour Deposition? Discuss on the usage of ceramics in Laser Chemical Vapour Deposition. (8)

14. a) Explain the production of customized implants using Additive Manufacturing. State how Additive manufacturing is used in manufacturing of prosthesis. (16)

(OR)

b) What is CATE? Explain the major field of applications of CATE in Tissue Engineering with suitable examples. (16)

15. a) Discuss the applications of Additive Manufacturing in Aerospace and Automobile sectors with suitable case studies. (16)

(OR)

b) Explain the challenges of using Additive Manufacturing in oil and gas industries with a suitable example. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE603 – Design and Drawing (Concrete and Steel)

(Use of IS 456, IS 800, IS 3370, SP 6 and SP 16 are Permitted)

Time : 3 Hours | Maximum Marks : 100

Part - A (1 x 60 = 60)

(Answer the Question)

1. a) A RCC cantilever type retaining wall is required to support the earth to a height of 5 m above the ground level. The top surface of the backfill is horizontal. The safe bearing capacity of the soil is 180 kN/m^2. Unit weight of soil is 17 kN/m^3. The angle of repose of soil is 30°. The coefficient of friction between concrete and soil is 0.55. Use M20 grade concrete and Fe415 grade steel (60)

   i) Design the retaining wall

   ii) Draw the sectional elevation and plan of vertical wall and base slab.

(OR)

   b) A ground level circular water tank has capacity of 5,00,000 litres. The bottom of the tank is fixed and the top is free. The safe bearing capacity of the soil is 250 kN/m^2. Use M30 grade concrete and Fe415 grade steel (60)

   i) Design the water tank

   ii) Draw the sectional elevation of vertical wall and sectional plan of base slab.

Part – B (1 x 40 = 40)

(Answer the Question)

2. a) Design a gantry girder for an industrial building carrying a manually operated overhead travelling crane for the following data (40)

   i) Crane capacity = 200 kN

   ii) Self-weight of the crane girder excluding trolley = 200 kN

   iii) Self-weight of the trolley, electric motor, hook, etc = 50 kN

   iv) Minimum approach of the crane hook to the gantry girder = 1.20 m

   v) Wheel base = 3.60 m

   vi) c/c distance between gantry rails = 20 m

   vii) c/c between columns = 8 m

   viii) Self-weight of rail section = 300 N/m

   ix) Diameter of crane wheels = 150 mm

   x) Grade of steel = Fe 410

   Design the gantry girder

   Draw the structural details of the gantry girder.

(OR)

b) A built up steel column comprising of two RSJ sections with their webs spaced at 300mm transmits a factored axial load of 3000 kN. The joists are connected by 10mm thick battens. The safe bearing capacity of the soil is 300 kN/m^2. Use M30 grade concrete. (40)

i) Design a suitable column and foundation adopting gusset plate

ii) Sketch the details of column and gusseted base foundation.

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

16PTECE19 – Internet of Things

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List the Challenges and issues of an IoT.
2. Distinguish Things in IoT and Machines in M2M.
3. Identify the process of M2M value chains.
4. Compare the Logical and physical design of IoT with respect to features.
5. Show the functions of gateway.
6. What is the purpose of business layer?
7. Name the features of IoT reference model.
8. Summarize the layers of IETF architecture of IoT.
9. Build the steps used in internet gateway device.
10. Justify the role of actuators in IoT.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Illustrate an example of IoT service in detail that follows request response model and publish – subscribe communication model. (16)

(OR)

b) Explain the potential and benefits of an IoT oriented approach over M2M by considering a Health band as the real world use case example. Compare the data collection and analysis approaches of M2M and IoT. (16)

12. a) Discuss the following in detail

i) M2M value chains (8)

ii) IoT value chains. (8)

(OR)

b) i) With the help of neat diagrams, explain the IoT system architecture. (8)

ii) List out the various steps involved in IoT system design methodology. (8)

13. a) i) Explain how gateways are used for data management, local applications and device management in IoT. (8)

ii) Sketch the visual representation of a home network with virtualized home gateway and identify its functions. (8)

(OR)

b) i) Categorize the various phases of CRISP-DM model and explain each with diagram. (8)

ii) Explain about the advanced management capabilities to satisfy the need for managing multiple devices in an IoT system. (8)

14. a) Explain Functional View, Information View, Deployment and Operational View, Other Relevant architectural views of IOT reference architecture. (16)

(OR)

b) Elaborate in detail about how the cloud storage models and communication APIs webserver using IoT. (16)

15. a) With the help of following sectors explain how IoT technology is impacting on the end-to-end value chain in the logistics sector: (16)

i) Route generation and scheduling

ii) Fleet tracking

iii) Shipment monitoring

iv) Remote vehicle diagnostic.

(OR)

b) Describe the architecture of an IoT based system for building automation. Also explain the deployment and operational view, resources, services, virtual entities, users, security involved in it. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEEE10 – High Voltage Direct Current Transmission

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention few HVDC projects in India.
2. List the types of DC link.
3. State the effect of source reactance on a twelve pulse converter without AC filters.
4. What are the advantages of higher pulse number of a converter?
5. What is the need for constant current regulation in HVDC converter valves?
6. Specify the purpose of extinction control.
7. How voltage is controlled by SVC?
8. Mention the performance criteria for selection of harmonic filter.
9. Specify the importance of per unit system.
10. What is the need for power flow analysis?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) With suitable schematics, elaborate the different kinds of HVDC links. (12)

ii) List the applications of HVDC transmission. (4)

(OR)

b) i) Compare EHVAC And HVDC lines. (12)

ii) List the disadvantages of HVDC transmission. (4)

12. a) With relevant figures and waveforms, explain the operation of 6 pulse Graetz bridge circuit without overlap. (16)

(OR)

b) Narrate how the selection of converters are performed for HVDC systems. (16)

13. a) Wita a neat sketch, explain the control characteristics of converter used in HVDC. (16)

(OR)

b) Create a circuit to control the VSC based HVDC link and explain the stratagies adopted. (16)

14. a) i) What are the filter configurations that are employed for HVDC converter station? Give the design aspect for one such filter. (12)

ii) Specify the sources of reactive power. (4)

(OR)

b) i) Elaborate the basic construction, principle of operation of STATCOM and its V_I Characteristics. (12)

ii) Why reactive power is to be controlled in power system. (4)

15. a) Specify the per unit quantities and explain the modelling of single phase per unit HVDC systems. (16)

(OR)

b) Elaborate about the power flow analysis in DC power system. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTMEE10 – Entrepreneurship Development

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List at least four important characteristics that an entrepreneur should possess.
2. Distinguish between entrepreneur and manager.
3. Name any four barriers to entrepreneurship development.
4. Infer the meaning of motivation.
5. List the sources of short term finance.
6. What are some of the pricing methods available related to marketing an enterprise?
7. What is importance of partnership deed?
8. Mention any three importance functions of SIDBI.
9. Name any four growth strategies available in a company.
10. Differentiate small scale industry from large scale industry.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) "Entrepreneur is the catalyst in the process of economic development". In the light of this statement judge the role of entrepreneurship in the economic growth of a country. (10)

ii) Classify the different types of entrepreneurs. (6)

(OR)

b) i) Point out and discuss the characteristics of entrepreneurs. (10)

ii) Explicate the salient features developed by experts on any one theory of entrepreneurship. (6)

12. a) i) Break down the motivational theories and assess them with relevant to entrepreneurial motivation. (10)

ii) Specify the various motivating factors. (6)

(OR)

b) i) Scrutinize the cultural, economic, and political and personality factors that affect entrepreneurial growth. (10)

ii) Identify any four successful entrepreneurs in your area and specify details. (6)

13. a) i) Elaborate in details the steps and components involved in preparing a business plan / project report. (10)

ii) State common errors in business plan formulation. (6)

(OR)

b) i) Explain the process of identifying and selecting a good business opportunity. (10)

ii) Justify the need for opportunity selection. (6)

14. a) i) Write short notes on: (10)

i) Co-operative

ii) Partnership.

ii) Elaborate the sources of long term loans. (6)

(OR)

b) i) Explain the different forms of ownership. (10)

ii) Write short notes on financial institutes. (6)

15. a) i) Identify sick industry in your area and suggest corrective measure for improvement. (10)

ii) Write short notes on business incubator. (6)

(OR)

b) i) List two state and central governments supporting entrepreneurship in India and explain in detail. (10)

ii) List the possible causes of sickness in small scale business. (6)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CE403 – Engineering Geology

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Illustrate weathering.
2. List the causes for Earthquake.
3. Distinguish between Ore and Mineral.
4. Define symmetry in rocks.
5. List some of the clay minerals.
6. Recall the term Metamorphism.
7. Distinguish between True dip and apparent dip of rock formation.
8. Define Outcrops.
9. Define Remote sensing.
10. Outline the term Parallax in Aerial Photograph.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain physical and chemical weathering process in detail. Add a note on weathering grade and its engineering significance. (16)

(OR)

b) i) Explain the geology of groundwater and types of groundwater (10)

ii) Enumerate the geological work of wind briefly. (6)

12. a) i) List the various physical properties of minerals and describe each property with examples. (8)

ii) Describe the properties and importance of (8)

i) Augite

ii) Hornblende.

(OR)

b) i) Explain the physical properties of Mica group of minerals with examples. (8)

ii) Explain briefly about the properties of (8)

i) Muscovite and

ii) Gypsum.

13. a) Explain the composition, texture, characteristics, occurrence and uses of black Granite, Basalt and Marble. (16)

(OR)

b) Analyse the Composition, Texture, characteristics, occurrence and uses of Laterite, Slate and Quartzite. (16)

14. a) Evaluate the Seismic Refraction survey to be conducted for determining the depth of bed rock. (16)

(OR)

b) Explain briefly the various types of folds with neat sketches. (16)

15. a) Discuss in detail the Foundation evaluation techniques and influence of geological conditions on Foundation and design of Dams. (16)

(OR)

b) Explain in detail about the role of Aerial Photographs and Satellite images in planning and execution of Civil Engineering Projects. (16)

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IV Semester (Full Time)

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COMPUTER SCIENCE AND ENGINEERING

18CS402 – Design and Analysis of Algorithms

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Differentiate between Time Complexity and Space Complexity.
2. Define Order of growth and compare the orders of growth of n(n-1)/2 and n2.
3. What is the Time Complexity for Binary Search Algorithm?
4. Illustrate the general characteristics of Greedy Algorithm.
5. Differentiate between Feasible and Optimal solution.
6. List out the applications of Dynamic Programming.
7. What is Backtracking? What are the applications of backtracking?
8. State Planar Colouring graph problem.
9. List the two properties that must be satisfied by a problem L to be NP complete.
10. Define NP completeness and NP hard.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain in details about Asymptotic Notations with suitable examples. (16)

(OR)

b) Solve the following recurrence relation using Back Substitution method (16)

i) $T(n) = 2T(n/2) + n$

ii) $T(n) = T(n/3) + C$.

12. a) Write an algorithm to find the Maximum and Minimum element in an array using Divide and Conquer strategy with suitable example. (16)

(OR)

b) Write Merge Sort algorithm and write its Time Complexity. Sort the list of elements 70, 80, 40, 50, 60, 12, 35, 95, 10 by using merge sort. (16)

13. a) Find the minimum cost path from S to T in Multistage graph using Dynamic Programming. (16)

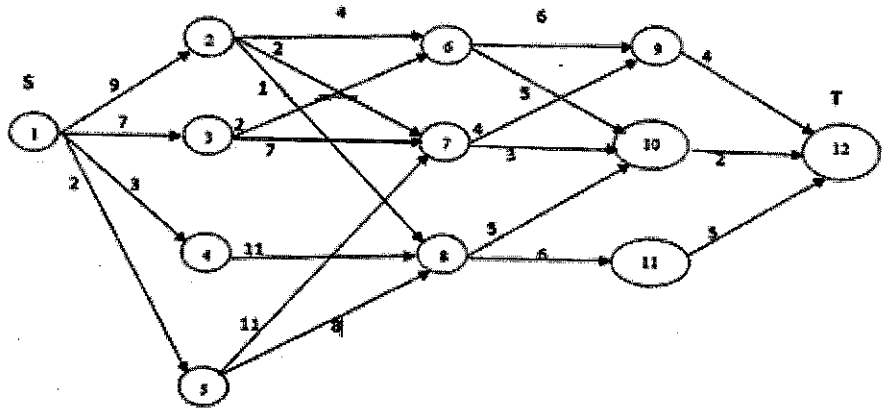

Figure.1.

(OR)

b) Solve the All-Pairs Shortest-Path problem for the digraph with the following weight matrix: (16)

$$\begin{vmatrix} 0 & 5 & \infty & 4 \\ \infty & 0 & 6 & \infty \\ 2 & \infty & 0 & \infty \\ \infty & 3 & 1 & 0 \end{vmatrix}$$

14. a) Describe the backtracking solution to solve 8 Queens' problem. (16)

(OR)

b) i) Consider a set S = {2, 3, 5, 6, 7, 9, 10} and M = 15. Solve it for obtaining the sum of subset. (10)

ii) Consider the graph shown below and find out the Hamiltonian cycle if it exits. (6)

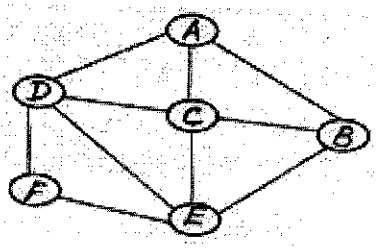

Figure.2.

15. a) Apply Branch and Bound Algorithm to solve the Travelling Salesman Problem. (16)

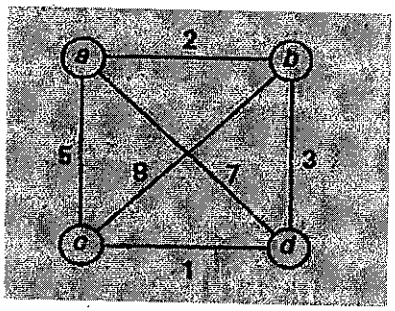

Figure.3.

(OR)

b) Discuss the approximation algorithm for NP – hard problems. (16)

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ELECTRONICS AND COMMUNICATION ENGINEERING

18EC402 – Analog Circuits

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State the Barkhausen criterion for an oscillator.
2. If L1 = 1 mH, L2 = 2 mH and C = 0.1 nF, Obtain the frequency of oscillation for Hartley oscillator.
3. Write short notes on triggering methods.
4. Mention the applications of blocking oscillators.
5. A Differential amplifier has a differential voltage gain of 3000 and common mode gain of 0.3. Determine CMRR.
6. Write short note about current mirror with magnification.
7. Draw the op amp integrator and differentiator circuit with necessary equation.
8. Plot the characteristics of LPF, HPF and BPF.
9. Compare the advantages and drawbacks of a dual-slop ADC.
10. Draw the functional block diagram of IC 723 regulator.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the principle of operation RC Phase shift oscillator using BJT amplifier with necessary equations and diagram. (16)

(OR)

b) Obtain the expression for frequency of oscillation and the condition for sustained oscillation of Hartley oscillator with neat circuit diagram. (16)

12. a) Explain single tuned amplifier and derive for gain, resonant frequency, and cut-off frequencies. What is the effect of cascading 'n' stage amplifier on bandwidth? (16)

(OR)

b) Illustrate the operation of collector coupled Astable multivibrator with neat diagrams and waveforms. And estimate the expression for pulse width Astable multivibrator. (16)

13. a) i) Draw the circuit of basic current mirror and explain its operation. (16)

ii) Give the detail the DC analysis of a basic differential amplifier.

(OR)

b) Obtain the expression for differential gain, common mode gain, CMRR, RI and RO of an emitter coupled differential amplifier. (16)

14. a) i) With neat sketch explain the working of Full wave Precision Rectifier in detail. (10)

ii) Sketch the Integrator circuit and explain the working principle in detail. (6)

(OR)

b) List the applications of OP-AMP and briefly explain any four in detail. (16)

15. a) Discuss in detail about the following Digital to Analog & Analog to Digital conversion techniques. (16)

i) Flash type and successive approximation ADC.

ii) Weighted resistor and R-2R ladder DAC.

(OR)

b) With a neat circuit diagram, explain the working of linear voltage regulator IC723 using operational amplifier. (16)

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IV Semester (Full Time)

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ELECTRICAL AND ELECTRONICS ENGINEERING

18EE403 – Measurements and Instrumentation

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Static sensitivity.
2. Classify analog instruments.
3. What is creeping in energy meter?
4. Which torque is absent in energy meter and why?
5. Is hysteresis an interisnsic property of the material?
6. Define fux density.
7. List the basic requirements of AC POT.
8. List the various detectors used in AC bridges.
9. Compare sensor and transducer.
10. What are the applications of pyrometer?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain any four static characteristics of measuring instruments. (8)

ii) Discuss of the construction and working principle of PMMC. (8)

(OR)

b) i) Discuss of the construction and working principle of MI. (8)

ii) Discuss on the dynamic characteristics of instruments. (8)

12. a) i) Discuss the construction and principle of electrodynamometer type wattmeter. (8)

ii) Derive the torque equation of deflection in electrodynamometer type wattmeter. (8)

(OR)

b) i) Describe the construction and operation of induction type wattmeter (8)

ii) Derive an expression for average torque which is proportional to power. (8)

13. a) i) How the B-H curve is determined using step-by – step method? (8)

ii) Discuss on Hopkinson's permeameters. (8)

(OR)

b) i) Elaborate on Illiovici Permeameters. (8)

ii) Write a technical note on magnetic measurements. (8)

14. a) i) Explain the applications and limitations of Wheatstone bridge. (8)

ii) Elaborate on anderson's bridge. (8)

(OR)

b) i) Compare Schering bridge with Wein's bridge. (8)

ii) Elaborate of Gall Tinsely co-ordinate type AC POT. (8)

15. a) i) Discuss the principles of operation of turbine meters. (8)

ii) Explain the working of Hot wire anemometer. (8)

(OR)

b) i) Classify transducers and elaborate on the factors influencing their choice. (8)

ii) Compare LVDT with RVDT. (8)

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IV Semester (Full Time)

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MECHANICAL ENGINEERING

18ME403 – Fluid Mechanics and Machinery

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define viscosity.
2. Classify manometers.
3. What are the assumptions followed for deriving Bernoulli's equation?
4. What is metacentric height?
5. What is an equivalent pipe?
6. What is the criterion to classify the flow as laminar or turbulent?
7. What are the classifications of a hydraulic turbine?
8. What are the uses of a draft tube?
9. What are applications of a positive displacement pump?
10. What is priming?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) The space between two square flat parallel plates is fitted with oil. Each side of the plate is 60 cm and the thickness of the oil film is 12.5 mm. The upper plate moves at 2.5 m/s requires a force of 98.1 N to maintain the speed. Determine the dynamic viscosity of the oil and kinematic viscosity. Take specific gravity as a 0.95. (8)

ii) Explain any one mechanical pressure gauge with a suitable sketch. (8)

(OR)

b) i) Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the center of the plate is 3 m below the free surface of water. Find the position of center of pressure also. (8)

ii) Describe the conditions of equilibrium of a floating and sub merged bodies. (8)

12. a) A 30 cm × 15 cm venturi meter is provided in a vertical pipe line carrying oil of specific gravity 0.9, the flow being upwards. The difference in elevation of the throat section and entrance section of the venturi meter is 30 cm. The differential U tube manometer shows a gauge deflection of 25 cm. Calculate i) the discharge of oil and ii) the pressure difference between the entrance section and the throat section. Take the coefficient of discharge as 0.98 and the specific gravity of mercury as 13.6. (16)

(OR)

b) The water is flowing through a taper pipe of length 100 m having diameters 600 mm at the upper end and 300 mm at the lower end, at the rate of 50 lps. The pipe has a slope of 1 in 30. Find the pressure at the lower end in terms of meter of water if the pressure at the higher level is 19.62 N/cm^2. (16)

13. a) An oil having relative density of 0.8 is pumped through a smooth horizontal pipe of 400 m long, 200 mm diameter and kinematic viscosity is 3.2 stoke. Differential pressure head between the two ends of the pipe is 15 m of oil. Assume the flow of oil is to be laminar, find (16)

i) rate of flow of an oil through the pipe

ii) power required to maintain the flow

iii) Also check whether the flow is actually laminar or not.

(OR)

b) The difference in water surface levels in tow tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm, and 400 mm respectively, is 12 m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively, considering (16)

i) minor losses also

ii) neglecting minor losses.

14. a) The penstock supplies water from a reservoir to the Pelton wheel with a gross head of 500 m. One third of the gross head is lost in friction in the penstock. The rate of flow of water through the nozzle fitted at the end of the penstock is 2 m^3/s. The angle of deflection of the jet is 165. Determine the power given by the water to the runner and also hydraulic efficiency of the Pelton wheel. Take speed ratio = 0.45 and $C_v = 1$. (16)

(OR)

b) A reaction turbine works at 450 RPM under a head of 120 m. its diameter at inlet is 120 cm and the flow area is 0.4 m^2. The angles made by absolute and relative velocities at inlet are 20° and 60° respectively with the tangential velocity. Determine (16)

i) The volume flow rate

ii) The power developed and

iii) Hydraulic efficiency. Assume whirl at outlet to be zero.

15. a) i) Compare centrifugal pump and reciprocating pump. (8)

ii) Draw the velocity diagram for a centrifugal pump and derive the equation to find the work done. (8)

(OR)

b) i) Explain the working principle of air vessel fitted in the reciprocating pump with suitable sketch. (8)

ii) Draw the indicator diagram for a reciprocating pump considering acceleration head and friction head. Mark the salient points. (8)

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IV Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MT403 – Iron Making

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Why blast furnace process is called as counter-current process?
2. List the raw materials used in blast furnace for iron making.
3. Outline the Boudouard equilibrium that occurs in C-O equilibria.
4. State Gruner's theorem.
5. Why preheating of blast is necessary?
6. Mention the different types of gas cleaning equipments.
7. Define Scaffolding.
8. Why desulphurization is necessary for hot metal?
9. Mention the limitations of low shaft furnace.
10. List the uses of sponge iron.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) With neat labelled sketch, draw the blast furnace with parts mentioning different zones and respective reactions. (8)

    ii) Explain the principle and the different stages involved in sintering process with neat sketches. (8)

(OR)

    b) i) List the various types of iron ores with composition. Explain the characteristics and selection of coal for iron making. (8)

    ii) What is pelletisation? Explain the green ball production and disc pelletiser with neat diagram. (8)

12. a) Explain in detail about C-O, Fe-H-O and Fe-C-O equilibria in detail with suitable graphs. (16)

(OR)

    b) Explain the physical chemistry of blast furnace reactions in detail. (16)

13. a) Explain the ancillary equipments for charging and discuss the bell less top charging system. (16)

(OR)

b) Discuss about the gas cleaning equipment with their principles and neat sketches in detail. (16)

14. a) Describe the blast furnace irregularities with their causes and remedy in detail. (16)

(OR)

b) Explain the gas flow in blast furnace and discuss the modern trends. (16)

15. a) i) Explain in detail about the HyL process with neat sketches. (8)

ii) Briefly discuss any two coal based of DR process in detail. (8)

(OR)

b) i) Discuss about the production of Ferro-Chrome. (8)

ii) Discuss about the production of Ferro-Manganese. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE402 – Mechanics of Soils

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. The natural water content of a saturated soil is 30%. If the specific gravity of solids of the soil is 2.7. Find its porosity.
2. Name any four methods of determining the field density of soil.
3. What is effective stress?
4. Mention the assumptions of Boussinesq's solution.
5. Write short note on quick sand condition.
6. What is Seepage Velocity?
7. Define: Coefficient of compressibility and compression Index.
8. Define Pre Consolidation Pressure. In what way is its determination important in soil engineering?
9. Write down the Mohr's-Coulomb Failure envelope equation.
10. UCC strength of clay was observed as 110 kN/m^2. What is its shear strength?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Briefly explain about the I.S Soil Classification system. (16)

(OR)

b) Classify the soils on the basis of the data provided. Where id additional information required? What data are needed? (16)

Soil Identification	$W_{L(\%)}$	$W_p(\%)$	% Passing through 75μ sieve	% of Grave 1	% of sand
A	450	50	100	0	0
B	34	20	80	0	20
C	60	30	90	0	10
D	30	Nonplastic	100	0	0
E	35	20	20	60	20
F	20	Nonplastic	10	20	70

12. a) The water table in a deposit of sand 8 m thick, is at a depth of 3 m blow the ground surface. Above the water table, the sand is saturated with capillary water. The bulk density of sand is 19.62 kN/m^2. Calculate the effective pressure at 1m, 3 m and 8 m below the ground surface. Hence plot the variation of total pressure, neutral pressure and effective pressure over the depth of 8 m. (16)

(OR)

b) An elevated structure is supported on a tower with four legs. The legs rest on piers located at the corners of a square of side 7 m. if the value of vertical stress increment due to this loading(considering 4 equal concentrated loads is 25 kPa, at a point 8m below the center of the structure, find the magnitude of this concentrated load. (16)

13. a) Explain the Constant Head permeability test in detail and list the properties of flow net. (16)

(OR)

b) Calculate the coefficient of permeability of a soil sample 6 cm in height and 50 cm^2 in cross sectional area, if a quality of water equal to 430 CC passed down in 10 minutes under an effective constant head of 40 cm. On oven drying, the test specimen weighed 4.98 N. Taking specific gravity of the solids a 2.65, Calculate the seepage velocity of water during the test. (16)

14. a) A 2 cm thick laboratory soil sample reaches 50 % consolidation in 45 seconds under double drainage condition. Find how much time will be required for a 12 m thick layer in the field to reach the same degree of consolidation if it has drainage on one side only. (16)

(OR)

b) How will you determine maximum dry density and optimum moisture content in the laboratory? Explain. (16)

15. a) A series of direct shear tests were conducted on a soil. Each test was carried out till the failure of sample and following results were obtained. (16)

Sample no.	Normal Stress (kN/m^2)	Shear Stress (kN/m^2)
1	14	16
2	28	23
3	42	30

Determine the shear strength parameters of the soil.

(OR)

b) Briefly discuss about the Vane shear test with neat diagram and its Limitations. (16)

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IV Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE402 – Transmission and Distribution

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Compare HVDC and HVAC Transmission system.
2. How feeder is different from distributor?
3. Outline the merits of using bundled conductors.
4. State the reason for absence of Skin effect in the dc system.
5. Define Ferranti Effect.
6. Point out any two reasons for line loss in transmission line.
7. What is meant by grading of cables?
8. A single core cable, 1.7 km long, has a conductor radius of 13 mm and insulation thickness of 5.8 mm. The dielectric has a relative permittivity of 2.8. Calculate the capacitance per meter length of cable.
9. Outline the functions carried out in sub-station.
10. Write the limitations of Radial distribution system.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Write the factors on which conductor spacing and ground clearance depend. (4)

ii) Draw the structure of electrical power system and explain its various voltage levels. (12)

(OR)

b) Elaborate the various types of HVDC system. Also mention its merits and demerits. (16)

12. a) i) Derive an expression for the capacitance between conductors of a single phase overhead line. (6)

ii) Find the capacitance between the conductors of a single-phase 10 km long line. The diameter of each conductor is 1.213 cm. The spacing between conductors is 1.25 m. Also find the capacitance of each conductor neutral. (10)

(OR)

b) Determine the inductance per km of a 3 phase transmission line using 20 mm diameter conductors when conductors are at the concerns of a triangle with spacing of 4, 5 and 6 meters. Are regularly transposed. (16)

13. a) Determine the efficiency and regulation of a 3 phase, 100 Km, 50 Hz transmission line delivering 20 MW at a power factor of 0.8 lagging and 66 kV to a balanced load. The conductors are of copper, each having resistance 0.1Ω/Km, 1.5 cm outside diameter, spaced equilaterally 2 metres between centres. Use nominal T method. (16)

(OR)

b) Derive the expression for sending and receiving end power of transmission line in terms of voltages and ABCD constants (16)

14. a) Draw the neat sketches and explanation of pin and suspension type insulators. Compare their merits and demerits. (16)

(OR)

b) i) With neat diagram, explain the various methods of grading of underground cables. (8)

ii) Calculate the most economical diameter of a single core cable to be used on 132 kV, 3 phase system. Find also the overall diameter of the insulation, if the peak permissible stress does not exceed 60 kV/cm. Also derive the formula used. (8)

15. a) Explain Neutral and Resistance grounding. (16)

(OR)

b) i) Examine the design principles of substation grounding system. (8)

ii) Explain the equipments in a transformer substation. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME402 – Mechatronics

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define mechatronics. List any two of the application of mechatronics.
2. State the different between primary and secondary transducer.
3. Distinguish between hydraulic and pneumatic systems.
4. Draw the sketches of 5/3 and 3/2 valves.
5. List any four advantages of stepper motor.
6. State the various components of a hydraulic system.
7. Define adaptive control.
8. State the purpose shift registers used in the PLC.
9. Name the two barriers used in automatic car parking system.
10. List any two sensors used in engine management system.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the working principle of LVDT with a suitable sketch. List the limitation of the LVDT. (16)

(OR)

b) Describe the pressure measuring systems and pressure measuring transducer with a suitable sketch. (16)

12. a) Explain in detail about the electromechanical system and hydraulic mechanical system. (16)

(OR)

b) Discuss the building blocks the following systems: (16)

i) Pneumatic and

ii) Electrical.

13. a) Explain the construction and working principle of AC servo motor with a suitable sketch. (16)

(OR)

b) Explain the construction or working of PID controller with a neat diagram. Also write mathematical equations for this. (16)

14. a) i) Explain the configuration of Programmable Logic Controllers (PLC). (12)

ii) State merits of the PLC system over the traditional mechanical system. (4)

(OR)

b) Explain the following: (16)

i) Counters

ii) Internal relays

iii) Timers.

15. a) Explain the construction of a pick and place robot and explain the various mechatronics system in the design. (16)

(OR)

b) Explain the concept of car engine management system by mechatronics approach. (16)

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V Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18EE503 – Power Electronics

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. How the power diode is classified based on reverse recovery characteristics?
2. What are the various protection schemes used for SCR?
3. Mention some of the applications of controlled rectifier.
4. What are the advantages of six pulse converter?
5. Write down the expression for average output voltage for step up chopper.
6. What are the two types of control strategies?
7. Why thyristors are not preferred for inverters?
8. How is the inverter circuit classified based on commutation circuitry?
9. What are the two methods of control in ac voltage controllers?
10. List the applications of ac voltage controllers.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the construction, operation, and switching characteristics of MOSFET. (16)

(OR)

b) Based on two transistor model, explain the turn ON mechanism of an SCR and explain how it remains in the ON state even though gate pulse is removed. Draw and explain its VI and switching characteristics. (16)

12. a) With the neat sketch and waveforms, explain the operation of single phase full controlled converter and derive its average and RMS output voltages. (16)

(OR)

b) With the neat sketch and waveforms, explain the operation of three phase dual converter in both circulating and non circulating modes. (16)

13. a) Draw the circuit of buck-boost regulator and explain its working principle with necessary waveforms. Derive the expression for peak to peak ripple voltage of capacitor that is present across the load. (16)

(OR)

b) With relevant sketches, explain the operation and analysis of two quadrant chopper. (16)

14. a) Explain in detail about the different PWM techniques used in inverters. (16)

(OR)

b) Explain the principle of operation of three phase VSI operating in 180° conduction modes with necessary wave forms. Also obtain the expression for line to line voltage. (16)

15. a) With necessary waveforms, explain the working of Single phase AC Voltage controller with R and RL Loads. (16)

(OR)

b) i) With neat circuit diagram, explain the basic principle of working of sequence controller. (10)

ii) Write short notes on Matrix converters. (6)

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B.E. Degree Examinations – April/May 2022

V Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MTE11 – Transport Phenomena

(Permitted to use Heat and Mass Transfer data book)

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Calculate the density and specific gravity of one litre of a liquid which weighs 7 N.
2. Distinguish between manometers and mechanical gauges. How manometers are classified?
3. Give the classification of boundary layer flow based on the Reynolds number.
4. Mention any two methods of preventing the separation of boundary layer.
5. State Fourier law of heat conduction.
6. What is Lumped system analysis? When it is applicable?
7. How does laminar flow differ from turbulent flow?
8. Why heat transfer coefficient for natural convection is much lesser than that of forced convection?
9. Define Fick's law of diffusion.
10. Give the examples of mass transfer.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Derive the Hagen-Poiseuille equation and state the assumptions made. (16)

(OR)

b) Derive the equation of continuity for the three dimensional incompressible fluid flows and reduce it one dimensional form. (16)

12. a) i) Describe with the help of sketch the construction, operation and use of Orifice tube. (8)

ii) Derive Bernoulli's equation from fundamentals. (8)

(OR)

b) i) Write short notes on flow through packed bed of solids and fluidized beds. (8)

ii) Write short notes on flow through packed bed of solids and fluidized beds. (8)

13. a) A plane wall is 150 mm thick and its wall area is 4.5 m^2. If its conductivity is 9.35 W/m°C and surface temperature are steady at 150°C and 45°C. Determine the Heat flow across the plane wall and temperature gradient in the flow direction. (16)

(OR)

b) A reactor's wall, 320 mm thick, is made up of an inner layer of fire brick (k = 0.84 W/m°C) covered with a layer of insulation (k = 0.16 W/m°C). The reactor operates at a temperature of 1325°C and the ambient temperature is 25°C. Determine the thickness of fire brick and insulation which gives minimum heat loss. (16)

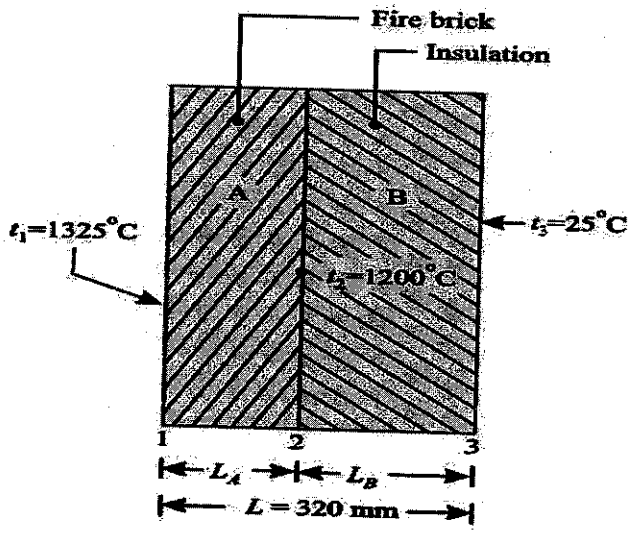

Figure.1.

14. a) After being annealed at 800°C, spherical steel balls of diameter 20 mm are allowed to cool slowly in a still air at 40°C under conditions in which the heat transfer coefficient is 30 W/m^2K. Calculate the time required for the temperature of the ball to fall to 150°C. (16)

(OR)

b) State Kirchoff's law of thermal radiation. Determine the radiant energy leaving a 50 mm diameter sphere at 1300 K and impinging upon a 1 m by 1.5 m wall. The sphere is located at central position and 1 m away from the wall. Assume all the surface to be black bodies. (16)

15. a) i) Explain briefly the analogy between heat and mass transfer. (8)

ii) Discuss the factors affecting diffusivity in solids, liquids and gases. (8)

(OR)

b) Derive an expression for concentration profile and molar flux when diffusion occurs through a stagnant gas film. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CE603 – Engineering Economics, Estimation and Costing

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by Consumer Price Index?
2. What is GST? Also write down the types.
3. State the sources of lenders to Contractors.
4. How do you control Inflation?
5. State the applications of Linear Programming in Economics.
6. How do you determine NPV?
7. What were the advantages of Five Year Plans?
8. What are the recent challenges in Fiscal and Social sectors in India?
9. State the uses of schedule of rates.
10. What are the uses of Mass Haul Diagram?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What are the basic Principles and Methodology of Economics? Discuss. (8)

ii) Explain briefly the law of demand and the law of supply. (8)

(OR)

b) i) Explain briefly about Open Economy and Closed Economy. Also discuss about the differences between the two. (8)

ii) Distinguish between Direct Taxes and Indirect Taxes. Also discuss about their importance. (8)

12. a) i) What are the types of Financing? Explain. (8)

ii) What are the functions of RBI? Explain. (8)

(OR)

b) i) What is the significance of Commercial Banks in India? Also explain briefly about the functions of Commercial Banks. (8)

ii) What are the causes of Inflation? Explain. (8)

13. a) i) What are the various elements of Managerial Economics? Also discuss about various forms of Organisation. (8)

ii) A father wishes to have a future sum of Rs. 1,00,000 for his son`s education after 10 years from now. What is the single payment he should deposit in bank now so that he gets the desired amount after 10 years? The bank gives 15% interest rate compounded annually. (8)

(OR)

b) i) Define Depreciation. Also discuss briefly about the different methods. (8)

ii) A company manufactures a single product with a sales price of Rs.10/-, a variable cost of Rs.6 per unit, Fixed cost of Rs. 60,000. Determine (8)

i) Number of units to Break even

ii) Sales at Break even

iii) Contribution to Sales ratio(in terms of percentages)

iv) Number of units to be sold to achieve a profit of Rs. 10,000.

v) Level of sales to achieve a profit of Rs. 30,000

vi) The new Breakeven point in units if there is an increase in variable cost by Rs.2 per unit, and increase in fixed cost by Rs.10,000 per annum.

14. a) i) Explain briefly the development of Indian Economy during the Post Independent period. (8)

ii) Discuss briefly about Employment opportunities in Informal, Organised and Unorganised sectors in India. (8)

(OR)

b) i) What are the causes of Urbanisation? Also discuss briefly about the relationship between Employment and Urbanisation. (8)

ii) Explain briefly about Demonetisation and its impact in Indian Economy. (8)

15. a) i) What are the different types of estimates? Explain. (6)

ii) Determine the quantities of materials required for (10)

i) First class Brickwork in CM 1:5 - 1 m^3

ii) Plastering in CM 1:6, 12 mm thick – 10 m^2.

(OR)

b) i) How do you estimate Earthwork for foundation of a Residential Building? Explain. (6)

ii) Write detailed specification for (10)

i) PCC 1:5:10 in foundation

ii) Brickwork in Cement Mortar 1:6 in superstructure.

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CSPE602 – Artificial Intelligence

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Give any two applications of Artificial Intelligence.
2. Compare Single agent with multiagent.
3. List any two Uninformed Search algorithms.
4. Why alpha-beta pruning is used in problem solving?
5. Define Generalized Modus ponens.
6. Differentiate Forward chaining and Backward chaining.
7. Draw the architecture diagram related to Reactive architecture that defines a simple agent.
8. Provide the structure of a Knowledge Query and Manipulation Language (KQML) message.
9. Why Machine Translation systems?
10. Compare Active sensors with Passive sensors.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) How problem characteristics help in the selection of AI techniques? Explain these characteristics with examples. (8)

ii) Solve 8 Queens problem using AI technique. (8)

(OR)

b) i) Compare Simple reflex agents and Model-based reflex agents. (8)

ii) Assess the Properties of task environments in intelligent agents. (8)

12. a) i) Compare Depth First Search and Breadth First Search with an example. (8)

ii) Elaborate the Simulated Annealing Search Algorithm with an example. (8)

(OR)

b) i) Explain the Constraint Satisfaction Problem (CSP) using Graph coloring. (8)

ii) Categorize the four types of consistencies used in Constraint Satisfaction Problem (CSP) and give an example for each. (8)

13. a) i) Represent the following Sentences in First Order Logic (8)

a) All students are smart

b) Bill takes either Analysis or Geometry (but not both)

c) Bill takes Analysis and Geometry.

d) No student hate Bill.

ii) Compare Propositional Logic and First Order Logic based on knowledge representation. (8)

(OR)

b) i) Illustrate the importance of ontological Engineering in Knowledge representation. (8)

ii) Elaborate the mental Events and mental objects related to knowledge representation. (8)

14. a) i) Explain Hybrid Agents architecture with a neat diagram. (8)

ii) Compare Reactive agent architecture with Deliberative agent architecture. (8)

(OR)

b) i) Explain the process of argumentation among agents with an example. (8)

ii) Illustrate the concept of trust and reputation in multiagent system with an example. (8)

15. a) i) Explain the N-gram character language model with an example. (8)

ii) List the four characteristics of Information Retrieval (IR) system and elaborate on IR scoring functions. (8)

(OR)

b) i) Explain the Robot hardware and Robotic perception in detail. (8)

ii) Illustrate the speech recognition system with an example. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18ECPE601 – Electronic Measurements

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Sensitivity.
2. Compare Static and Dynamic characteristics of measurement systems.
3. Define duty cycle for a Pulse value.
4. List the various types of Signal analyzer.
5. State the principle of CRO.
6. Differentiate between Digital and Analog oscilloscope.
7. Draw the diagram of Kelvin double bridge.
8. List some applications of AC bridge.
9. Define Transducer.
10. What is Piezo electric effect?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) List and discuss the various types of Errors in electronic measurements. (8)

    ii) What is Standard? Explain the different types of Standards. (8)

(OR)

    b) i) With neat sketch, explain the working principle of Shunt type Ohmmeter. (8)

    ii) With necessary diagram, enumerate the working principle of Digital Multimeter. (8)

12. a) Describe the working of Function generator with necessary block diagrams. (16)

(OR)

    b) With suitable diagram explain the principle of operation of Wave analyzer and Spectrum analyzer in detail. (16)

13. a) Discuss about Frequency Measurement using Lissajous method and write about the various features of MSO with suitable applications. (16)

(OR)

b) Explain briefly about the working of Digital Storage Oscilloscope with block diagram. (16)

14. a) i) Explain the basic principle and operation of Wheat stone bridge. (8)

ii) Discuss about the errors and precautions in using bridges. (8)

(OR)

b) i) Derive the bridge balance condition for the Maxwell bridge. (8)

ii) Explain the measurements of frequency by Wein's bridge. (8)

15. a) Explain the construction and working principle of Linear Variable Differential Transformer (LVDT). (16)

(OR)

b) Define Data Acquisition? Give the block diagram of Data Acquisition System and describe the function of each component. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

ELECTICAL AND ELECTRONICS ENGINEERING

18EE603 – Professional Ethics and Human Values

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Explain the importance of Civic virtue.
2. Examine the spirituality and give its importance.
3. Choose a situation explain moral dilemma.
4. List the types of inquiry.
5. Conclude the result of challenger case study.
6. Classify the limitation of code of ethics.
7. Compare the safety and risk.
8. Analyse the need of Risk benefit analysis.
9. Conclude the result of weapon development.
10. Appraise the IEEE and its significance.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	i)	Infer about co-operation and commitment.	(8)
		ii)	Examine about morals, values and Ethics.	(8)
			(OR)	
	b)	i)	Discuss empathy and self-confidence.	(8)
		ii)	Analyse about caring and sharing.	(8)
12.	a)		Appraise about Kohlberg and Gilligan theory.	(16)
			(OR)	
	b)		Classify the theories of right action.	(16)
13.	a)	i)	Explain about engineering as social experimentation.	(8)
		ii)	List the hurdles faced by engineer as social experimenter.	(8)
			(OR)	
	b)	i)	Conclude in a brief about balance outlook of law.	(8)
		ii)	Make use of challenger case study write a summary.	(8)

14. a) i) List the backlogs and advantages of IPR. (8)

ii) Discriminate collective bargaining and confidentiality. (8)

(OR)

b) i) Explain briefly about professional rights. (8)

ii) Inspect the worst effect of three mile island and Chernobyl case studies. (8)

15. a) i) Analyze about the computer ethics. (8)

ii) Categorise the various MNCs. (8)

(OR)

b) i) Categorize the codes of ASME and ASCE. (8)

ii) List the sample code of IEEE. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18ME603 – Design of Machine Elements

(Usage of approved design data book to be Permitted)

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define fits and tolerances. How are they designated?
2. Classify the different types of loads that can act on machine components.
3. When the shaft is subjected to fluctuating loads, what will be the equivalent twisting moment and equivalent bending moment?
4. Give at least three practical applications of coupling.
5. Express the meaning of bolt M24 x 2.
6. What is the minimum size for fillet weld? If required weld size from strength consideration is too small how will you fulfill the condition of minimum weld size?
7. List out the various function of a spring. In which type of sprig the behavior is non-linear?
8. Define the term fluctuation of energy.
9. List any two advantages of rolling contact bearings.
10. Write down the formula to calculate the heat generated and heat dissipated in journal bearing.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) A mild steel shaft of 50 mm diameter is subjected to a bending moment of 2000 N-m and a torque T. If the yield point of the steel in tension is 200 MPa, Calculate the maximum value of this torque without causing yielding of the shaft according to (16)

    i) The Maximum principle stress;

    ii) The maximum shear stress and

    iii) The maximum distortion strain energy theory of yielding.

(OR)

b) A steel shaft is subjected to completely reverse bending moment of 800 N-m and a cyclic twisting moment of 500 N-m which varies over a range of ± 40%. Determine the diameter of shaft if a reduction factor of 1.2 is applied to the variable component of bending stress and shearing stress. Assume (16)

i) That the maximum bending and shearing stresses are in phase

ii) That the tensile yield point is the limiting stress for steady state component

iii) That the maximum shear strength theory can be applied and

iv) That the Goodman relation is valid take following material properties:

Yield strength = 500 MPa; Ultimate strength = 800 MPa; Endurance limit = ± 400 MPa.

12. a) A shaft is supported by two bearings placed 1m apart. A 600 mm diameter pulley is mounted at a distance of 300mm to the right of left hand bearing and this drives a pulley directly below it with the help of belt having maximum tension of 2.25 kN. another pulley 400 mm diameter is placed 200 mm to the left of right hand bearing and is driven with the help of electric motor and belt, which is placed horizontally to the right. The angle of contact for both the pulleys is 180° and μ = 0.24. Determine the suitable diameter for a solid shaft, allowing working stress of 63 MPa in tension and 42 MPa in shear for the material of shaft. Assume that the torque on one pulley is equal to that on the other pulley. (16)

(OR)

b) A shaft made of steel receives 7.5 kW power at 1500 rpm. A pulley mounted on the shaft as shown in figure.1. has ratio of belt tension 4. The gear forces are follows Ft = 1590 N; Fr = 580 N Design the shaft diameter by maximum shear stress theory. The shaft material has the following properties. Ultimate tensile strength = 720 MPa; Yield strength = 380 MPa; Factor of safety = 1.5. (16)

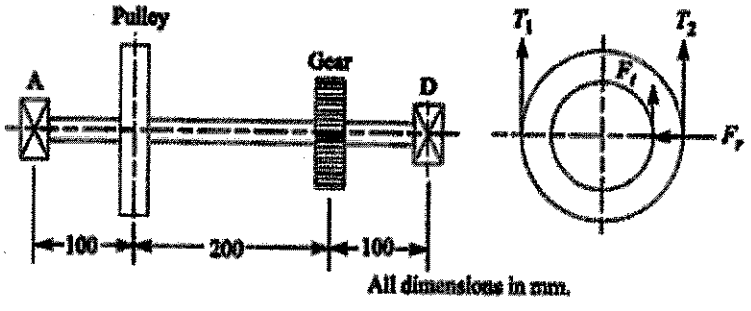

Figure.1.

13. a) A plate 75 mm wide and 12.5 mm thick is joined with another plate by a single transverse weld and a double parallel fillet weld as shown in figure.2. The maximum tensile and shear stress are 70 MPa and 56 MPa respectively. Calculate the length of each parallel fillet weld if the joint is subjected to both static and fatigue loading. (16)

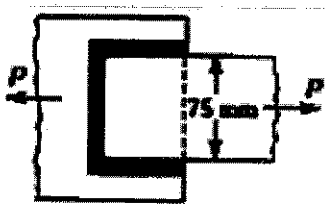

Figure.2.

(OR)

b) Design a knuckle joint for a tie rod of a circular cross section to sustain a maximum pull of 70 kN. The ultimate, strength of the material of the rod against tearing is 420 MPa. The ultimate tensile and shearing strength of the pin material are 510 MPa and 396 MPa respectively. Determine the tie rod section and pin section. Take factor of safety=6. (16)

14. a) Design closed coiled helical spring subjected a tensile load of magnitude varying from 2250 N to 2750 N and the axial deflection of spring for this range of load is 6 mm. Design the spring, taking the spring index as 5 and safe shear stress for material equal to 420 MPa. $G = 84\ kN/mm^2$. (16)

(OR)

b) Determine the dimensions of an I-section connecting rod for a petrol engine from the following data: Diameter of the piston = 110 mm; Mass of the reciprocating parts = 2 kg; Length of the connecting rod from the centre to centre = 325 mm; Stroke length = 150 mm RPM = 1500 with possible over speed of 2500; Compression ratio = 4:1; Maximum explosion pressure = 2.5 N/mm^2. (16)

15. a) A full journal bearing of 50 mm diameter and 100 mm long has a bearing pressure of 1.4 MPa. The speed of the journal is 900 rpm and the ratio of journal diameter to the diametrical clearance is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75°C may be taken as 0.011 kg/m-s. The room temperature is 35°C. Calculate (16)

i) The amount of artificial cooling required and

ii) The mass of the lubricating oil required, if the difference between the outlet and inlet temperature of the oil is 10°C. Take specific heat of the oil as 1850 J/kg/°C.

(OR)

b) A ball bearing subjected to a radial load of 4000 N is expected to have a satisfactory life of 12000 hours at 720 r.p.m. with a reliability of 95%. Calculate the dynamic load carrying capacity of the bearing, so that it can be selected from manufacturer's catalogue based on 90% reliability. If there are four such bearings each with a reliability of 95% in a system, what is the reliability of the complete system? (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MT603 – Foundry Processes and Metallurgy

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Recall Master Pattern.
2. State the purpose of Shatter Index test.
3. Write the reaction involved during hardening of CO_2 mould.
4. What is squeeze casting?
5. What can you say about Yield in a foundry?
6. Mention the software's used in foundry applications.
7. What are the precautions carried out due to pollution control in foundries?
8. Why the gas cutting is not suitable for removal of riser in Stainless steel castings?
9. Recall Inoculation in cast iron.
10. What are the elements used for modification treatment in Al-Si system?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the types of allowances used in pattern making. (8)

ii) Explain the different types of patterns used in a foundry with neat sketches. (8)

(OR)

b) i) Determine the Permeability of moulding sand using permeability meter. (8)

ii) Determine the AFS grain fineness number of foundry sand using sieve analysis. (8)

12. a) Analyze the process, advantages and applications of Shell moulding and Investment casting process with neat sketches. (16)

(OR)

b) i) Compare Hot chamber and Cold chamber die casting process with examples. (8)

ii) Explain the full mould process with a neat sketch. (8)

13. a) i) Analyze the factors increasing the riser efficiency. (8)

ii) Design a riser system for a cylindrical casting of 100 mm diameter and 500 mm height using insulating sleeves. (8)

(OR)

b) Calculate the gating dimensions of a hollow cylindrical SG Iron casting of 80 cm outer diameter, 50 cm inner diameter and 300 cm height. Distances between two in gates are 30 cm. Minimum 2 runner bars are used. (16)

14. a) Analyze the causes and remedies of various casting defects. (16)

(OR)

b) i) Discuss the types of sand reclamation process. (8)

ii) Write a technical note on cleaning and repair of castings. (8)

15. a) Explain the melting practice of SG Iron using coreless induction furnace. (16)

(OR)

b) i) Analyze the various degassing techniques. (8)

ii) Analyze the factors affect the fluidity of molten metal and also explain the fluidity measurement methods. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE602 – Water Resources Engineering

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by Isohyet?
2. Write down the various forms of Precipitation.
3. What are the types of Reservoir?
4. Define Trap Efficiency.
5. Distinguish between Aquifer and Aquiclude.
6. State Dupit's assumptions.
7. Write down the types of canals based on its functions.
8. What are the advantages of Lined Canals?
9. State the objectives of River training.
10. What are the types of Drainage system?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain in detail Hydrologic Cycle with a sketch. (8)

ii) The ordinates of an 8 hour Unit hydrograph are given below. Determine the ordinates of 4 hour Unit hydrograph. (8)

Time(Hour):	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates(cumec):	0	20	80	130	150	130	90	52	27	15	5	0

(OR)

b) i) Explain in detail about the measurement of Rainfall by Tipping Bucket type Raingauge with a diagram. (8)

ii) Determine the average precipitation by Thiessen Polygon method and Arithmetic average method for the following data. (8)

Station No	**Precipitation (mm)**	**Area of Thiessen Polygon**
A	30	45 Sq. Km
B	34	38 Sq. Km
C	32	30 Sq. Km
D	24	40 Sq. Km

12. a) i) What are the functions of Reservoir? Explain. (8)

ii) How do you determine the Safe Yield of a Reservoir from the Mass curve? Explain. (8)

(OR)

b) i) How do you control Evaporation in Reservoirs? Explain. (8)

ii) What are the effects of Sedimentation in a Reservoir? How do you control it? Discuss. (8)

13. a) i) Explain briefly about Confined, Unconfined and Perched Aquifers with sketches. (8)

ii) How do you determine Yield of Well by Pumping Test? Explain. (8)

(OR)

b) i) Derive the equation for discharge of an open well in Confined Aquifer. (8)

ii) A 30 cm well completely penetrates an unconfined aquifer of saturated depth 40 m. After the long period of pumping at a steady rate of 1500 l.p.m., the drawdown in two observations wells 25 m and 75 m from the pumping well were found to be 3.5 m and 2.0 m respectively. Determine the Transmissibility of the aquifer and the drawdown at the well. (8)

14. a) i) Compare Kennedy's theory and Lacey's Regime theory. (8)

ii) Design an irrigation channel using Kennedy's Theory to carry a discharge of 44 cumecs. Assume N = 0.0225 and m = 1. The channel has a bed slope of 1 in 5000. Assume suitable data. (8)

(OR)

b) i) What are the different materials used for Canal Lining? Explain. (8)

ii) Discuss briefly about the applications of GIS in the distribution system. (8)

15. a) Explain in detail about Guide Bank System and Pitched Islands. (16)

(OR)

b) Discuss in detail the causes, effects and remedial measures of Water logging. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

16PTEC602 – VLSI Design

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. List out any four second order effects of MOS transistor.
2. Draw the 4X1 MUX diagram using transmission gates.
3. State the process sequences of p-well and n-well formations.
4. How do you prevent latch up problem?
5. What is meant by bit-sliced data path organization?
6. Why we go to Booth's algorithm?
7. Define modules and ports in VHDL.
8. Mention few data types in VHDL.
9. Write the design style classification in ASIC.
10. What are the different types of programming structure available in PAL?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Describe the equation for source to drain current in the three regions of operation of a MOS transistor and draw the VI characteristics. (16)

(OR)

b) Draw and explain the D.C and transfer characteristics of a CMOS inverter with necessary conditions for the different regions of operation. (16)

12. a) Explain the different steps involved in n-well and p-well CMOS fabrication process with neat diagrams. (16)

(OR)

b) i) If the sheet resistance of aluminum is 0.05 Ω/sq, and the sheet resistance of polysilicon is 30 Ω/sq. Calculate the resistance of 5mm run of each material, assuming a 4 μm wire width. If sheet resistance remains the same, calculate the resistance for a 5 mm run based on a 0.5 μm wire width. (8)

ii) A transistor is built by overlaying a 2 μm by 6μm polysilicon gate centrally over a 4 μm by 14 μm thin oxide region. $C_{ox} = 10^{-3}\, pf/\mu m$, $C_{ja} = 10^{-4}\, pf/\mu m^2$, $C_{jp} = 10^{-4}\, pf/\mu m^2$, and $C_p = 5X10^{-5}\, pf/\mu m^2$. Calculate the capacitance of the polysilicon region and the diffused regions. (8)

13. a) Explain the structure of booth multiplier with a suitable example and list its advantages. (16)

(OR)

b) Design and explain the NOR-based ROM and NAND-based ROM arrays with neat diagrams. (16)

14. a) What are the various modeling used in VHDL? Explain them. (16)

(OR)

b) Explain the VLSI design flow with a neat flow chart diagram. Write VHDL program for 4-bit full adder in structural modelling. (16)

15. a) i) What are the types of gate arrays in ASIC? Explain with neat diagram. (8)

ii) What are the different methods of programming of PALs? Explain with neat diagram. (8)

(OR)

b) i) Draw and explain Actel ACT 1, Logic Modules with help of Shannon's expansion theorems. (8)

ii) Explain Actel ACT1 logic Module as a Boolean function generator through WHEEL functions implementations with its necessary diagrams. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEEE07 – Special Electrical Machines

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the primary design considerations of synchronous reluctance motor?
2. Mention the applications of synchronous reluctance motor.
3. How stepper motors are classified?
4. What is meant by full step operation?
5. What is SRM and state the reluctance principle?
6. Why switched reluctance machines are popular in adjustable speed drives?
7. State the advantages and disadvantages of brushless DC motor drives.
8. Why the PMBLDC motor is called electronically commutated motor?
9. What are the assumptions made in deriving the torque equation of PMSM?
10. Write the significance of power controllers of PMSM.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the constructional features of synchronous reluctance motor. (8)

ii) Describe the steady-state phasor diagram of synchronous reluctance motor. (8)

(OR)

b) i) Explain the speed - torque characteristics of synchronous reluctance motor. (8)

ii) Explain the constructional features of Vernier motor. (8)

12. a) i) Explain the construction and various modes of excitation of variable reluctance stepper motor. (10)

ii) Mention the applications of stepper motor. (6)

(OR)

b) i) Explain the operation of driver system and control circuitry for stepper motor. (10)

ii) Mention the advantages and disadvantages of stepper motor. (6)

13. a) i) Explain the operation of SRM with a neat diagram. (10)

ii) Draw and explain the torque-speed characteristics of SRM. (6)

(OR)

b) i) Derive the voltage and torque equation of SRM. (10)

ii) Describe microprocessor based control of SRM drive. (6)

14. a) i) Brief the construction of PMBLDC motor. (10)

ii) Compare the electronic commutator and mechanical commutator. (6)

(OR)

b) i) Write the torque equation of PMBLDC motor and Explain the characteristics. (10)

ii) Write a note on power controllers used in PMBLDC motor. (6)

15. a) i) Explain the self-control of PMSM. (8)

ii) Mention the salient features and applications of PMSM. (8)

(OR)

b) i) Discuss the microprocessor based control of PMSM. (8)

ii) Derive an expression for torque developed in PMSM. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME602 – Finite Element Analysis

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. List the various methods of solving boundary value problems.
2. Distinguish between error and residual.
3. Define shape function.
4. Deduce the stiffness matric for 1D two noded linear elements.
5. Illustrate the shape function of a CST element.
6. What do you understand by area coordinates?
7. Differentiate between geometric and material non-linearity.
8. Highlight the purpose of Isoparametric element.
9. What is meant by steady state heat transfer?
10. Develop a simple problem in Incompressible fluid flow.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Enumerate the advantages and disadvantages of FEM. (12)

ii) Discuss briefly about weak formulation. (4)

(OR)

b) Explain the step by step procedure of FEA. (16)

12. a) Examine the nodal displacement, stress and strain for the bar shown in Figure.1. (16)

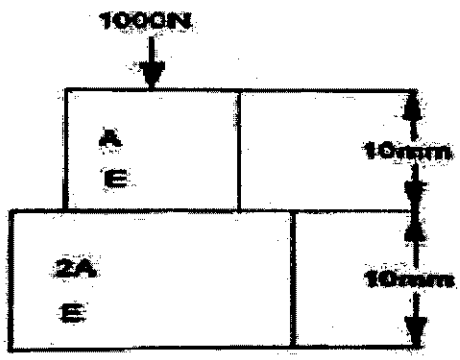

Figure.1

(OR)

b) i) Describe elaborately about various one dimensional elements in FEA. (12)

ii) Develop the shape function for 1D linear element. (4)

13. a) Estimate the stiffness matric for the triangular element with (x, y) coordinates of the nodes are (0, -4), (8, 0) and (0, 4) at nodes i, j, k. Assume plane stress condition E = 200 GPa and Poisson's ratio = 0.35. (16)

(OR)

b) i) Discuss a plane stress problem with the help of a suitable example. (8)

ii) Explain the shape functions of four noded rectangular elements. (8)

14. a) Elucidate the Lagrange linear interpolation functions for the higher order one dimensional elements and sketch graphically. (16)

(OR)

b) A four noded rectangular element is shown in figure.2. Depict the following: (16)

i) Jacobian matrix

ii) Strain-Displacement matric

iii) Element strain and

iv) Element stress.

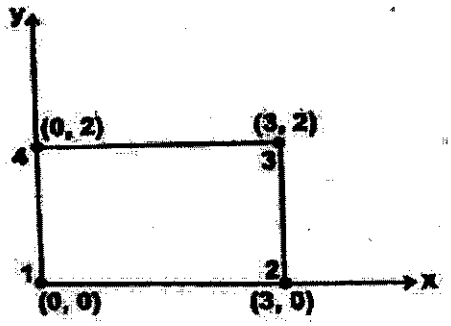

Figure.2.

15. a) i) Describe shortly about one dimensional heat conduction with a neat sketch and also write the governing equation. (8)

ii) Model a circular rod using two elements and assemble the global conductivity matrix. Assume the necessary geometric parameters. (8)

(OR)

b) Analyze Galerkin's approach with reference to any one-dimensional heat conduction problem. (16)

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IV Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CE402 – Design of Steel Structural Elements

(Use of IS: 800-2007 and Steel tables are to be Permitted)

Time : 3 Hours | Maximum Marks :100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Write down any two load combinations as per the codal provisions.
2. Write mechanical properties of steel that plays an important role in the strength development of a joint.
3. How are the connections classified?
4. Differentiate welded connection from bolted connection.
5. How do you calculate the load carrying capacity of any tension member?
6. What are the failure modes of tension member?
7. As the slenderness ratio of the column increases, its strength decreases. Justify your answer.
8. If kL/r = 55 and f_y = 250 N/mm²& Buckling class is 'C' then find the value of 'f_{cd}' from IS: 800-2007.
9. What is web crippling?
10. State the formula to find plastic section modulus for any section.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Write short notes on the different design concepts that are followed in the steel design. (8)

    ii) Compare the strength and stiffness with stability of any structure. (8)

    (OR)

    b) i) Draw a stress-strain curve and mention the mechanical properties of the structural steel elements. (8)

    ii) Recall the types of load acting on the structure with various load combinations. (8)

12. a) Design a lap joint between two plates to transmit a factored load of 70 kN using M16 bolts of grade 4.6 and grade 410 plates. Thickness of plates are 12 mm and 20 mm. Width of plate is 80 mm. (16)

(OR)

b) An ISLC at 324 N/m is to carry a factored tensile force of 900 kN. The channel section is to be welded at the site to a 12 mm thick gusset plate. Design a fillet weld, if the overlap is limited to 350 mm. (16)

13. a) i) Write the types of section available for tension members and illustrate the calculation of net effective sections for angles with formula. (8)

ii) Enumerate the application of lug angles and shear lag. (8)

(OR)

b) Design a splice for joining tension member sections 160 mm x 10 mm and 250 mm x 14 mm. The member is subjected to tensile load of 200 kN. Use M20 bolts of grade 4.6. (16)

14. a) Design a column to carry 1000 kN compressive load. The column is 4 m high and both ends are fixed. (16)

(OR)

b) Explain the design procedure of laced column. (16)

15. a) i) Summarize the design considerations of laterally supported beams. (8)

ii) Calculate the plastic modulus of a rectangular section whose width is 'b' and depth is 'D'. (8)

(OR)

b) i) Write short notes on web buckling with neat sketches. (8)

ii) Explain the behaviour of beam under shear. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CS401 – Computer Networks

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Difference between half-duplex and full-duplex transmission modes.
2. Model a hybrid topology with a star backbone and four ring networks.
3. How does a single-bit error differ from a burst error? Give example.
4. What is the purpose of token passing mechanism in Token Ring?
5. Classify the ranges of Classful Addressing. Identify 14.23.120.8 belongs to which class.
6. Difference between Bridges and Routers.
7. What are the duties of transport layer?
8. Define Integrated Services. Mention its problems.
9. State the purpose of encryption and decryption.
10. What is URL? List out its components?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain about the layers in OSI model and its responsibilities with a neat sketch. (16)

(OR)

b) Describe about Guided transmission media and its types with a neat sketch. (16)

12. a) i) Given the data word 1010011010 and the divisor 10111. Show the generation of code word at the sender side and check the code word at the receiver side. (8)

ii) Consider the binary data 1001101 is to be transmitted. Implement 11-bit hamming code error detection and correction method using even parity and determine the position of data bits and redundancy bits. If the 7th bit value is changed during transmission, identify and correct the error position in decimal value at the receiver side. (8)

(OR)

	b)	i)	Illustrate with example about Stop-and-wait ARQ.	(8)
		ii)	Explain about Sliding Window ARQ with suitable cases.	(8)
13.	a)		Examine the datagram format of IPV4 and IPV6 datagram format.	(16)
			(OR)	
	b)		Illustrate Distance Vector Routing with suitable example.	(16)
14.	a)		Examine TCP segment format and phases of TCP connection in detail.	(16)
			(OR)	
	b)		Examine the categories of Congestion Control.	(16)
15.	a)		Explain in detail about HTTP.	(16)
			(OR)	
	b)		Describe about WWW and the categories of web document.	(16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

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ELECTRONICS AND COMMUNICATION ENGINEERING

18EC401 – Antenna and Wave Propagation

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define the radiation resistance of an antenna. What is the importance of this quantity?
2. Define Half power beam width (HPBW) of an antenna.
3. How can we eliminate minor lobes?
4. Design a three element Yagi-Uda antenna to operate at a frequency of 200 MHz.
5. Define pitch angle of a helical antenna.
6. What are the limitations of rhombic antenna?
7. What is Lunenberg lens?
8. Define the characteristic impedance of biconical antenna.
9. How will you find the range of space wave propagation or Line of sight distance?
10. Find the critical frequency of an ionosphere layer which has an electron density of $1.24 \times 10^8\ cm^{-3}$.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Derive the expression for the field quantities radiated from a $\lambda/2$ dipole and prove the radiation resistance to be 73 Ω. (16)

(OR)

b) Define the following parameters and their dependence an antenna performance (16)

i) Directivity

ii) Gain

iii) Radiation Pattern

iv) Effective length

v) Polarization

vi) Beam solid angle.

12. a) i) Derive the expressions for field pattern of end-fire array of two sources of equal amplitude and spacing. (8)

ii) What is binomial array? Obtain the excitation coefficients of nine element binomial array. (8)

(OR)

b) i) Using pattern multiplications determine the radiation pattern for 8 element arrays separated by the distance $\lambda / 2$. (8)

ii) With necessary illustrations explain the radiation characteristics of multielement log periodic dipole antenna and mention its applications. (8)

13. a) i) With neat diagram explain the principle of parabolic reflector antenna and various types of feed used. (8)

ii) Find the diameter of a Dish antenna that will form a beam having 0.5 degree Half power Beam width (HPBW) at a frequency of 8.2 GHz. Assuming an efficiency constant of 0.6, calculate the antenna gain and effective aperture. (8)

(OR)

b) i) With neat diagram explain helical antenna and briefly describe its operation in the axial mode. How does it differ from other antennas? (8)

ii) Explain the construction, radiation pattern and features of the rhombic antenna. (8)

14. a) i) Discuss the radiation from Huygen's source. (8)

ii) In detail, develop the various methods of feeding a slot antenna. (8)

(OR)

b) i) Explain the principle of rectangular horn antenna with a neat sketch. Draw various types of horn structure. (8)

ii) Describe the radiation patterns and fields on the axis of an E plane and H plane sectorial horn. (8)

15. a) i) Draw the structure of ionosphere and explain the mechanism of ionosphere propagation. (8)

ii) Discuss the effects of earth's magnetic field on ionosphere radio wave propagation. (8)

(OR)

b) i) Derive an expression for the refractive index of the ionosphere in terms of the electron number density and frequency? (8)

ii) Describe the space wave propagation and explain the importance of line of sight propagation. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18EE402 – Synchronous and Induction Machines

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the conditions to be satisfied for proper synchronization of alternators.
2. Why is the MMF method of estimating the voltage regulation considered as the optimistic method?
3. Why a synchronous motor is called as constant speed motor?
4. Name the important characteristics of a synchronous motor not found in an Induction Motor.
5. What are the advantages of skewed slots in the rotor of a squirrel cage motor?
6. A 4 –Pole, 3 Phase, 50 Hz star connected induction motor has a full load slip of 4%. Calculate full load speed of the motor.
7. State the condition of maximum torque developed by three phase induction motor.
8. Draw the power flow diagram of an induction motor.
9. What are the tests necessary to draw the equivalent circuit of single phase induction motor?
10. Is it possible to reverse direction of rotation in case of shaded pole type? Justify your answer.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive an emf equation of alternator and define its various terms. (8)

ii) A three phase 16 pole alternator has star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.04 Wb and is distributed sinusoidally. The speed is 375 rpm. Find the frequency, phase emf and line emf. The coil span is 120 degrees electrical. (8)

(OR)

b) i) Discuss the synchronous impedance method of determining the regulation of an alternator. (8)

ii) Describe how the direct and quadrature-axis reactance of a salient-pole synchronous machine can be estimated by means of slip test. (8)

12. a) i) Draw and explain the phasor diagram of a cylindrical rotor synchronous motor operating at different power factors. (8)

ii) Explain briefly the various methods of starting synchronous motor. (8)

(OR)

b) i) A three phase 11000 V, star connected synchronous motor takes a load of 100 A. The effective synchronous reactance and resistance per phase are 30 Ω and 0.8 Ω respectively. Find the power supplied to the motor and the induced emf for 0.8 power factor lagging. (8)

ii) Explain briefly how a synchronous motor operated as a synchronous condenser. (8)

13. a) i) Describe the working principle of a 3-phase induction motor. (8)

ii) Explain the effects of slip on rotor parameters of Induction Motor. (8)

(OR)

b) i) Explain a brief note of an Induction Generator in self-excitation mode. (8)

ii) What is the need of the starter? And explain the rotor resistance starter of induction motor. (8)

14. a) i) A 3 phase, star connected 400 V, 50 Hz, 4 pole induction motor has the following per phase parameters in ohms, referred to the stator. $R_1 = 0.15$, $X_1 = 0.45$, $R'_2 = 0.12$, $X'_2 = 0.45$, $Xm = 28.5$. Compute the stator current and power factor when the motor is operated at rated voltage and frequency with $s = 0.04$. (8)

ii) Derive the torque equation under running condition of three a phase induction motor. (8)

(OR)

b) i) Derive the equivalent circuit of a three phase induction motor. (8)

ii) The real power input to a 415 V, 50 Hz, 6 Pole, 3 phase induction motor running at 970 rpm is 41 kW. The input power factor is 0.9. The stator losses are 1 kW and mechanical losses total 1.2 kW. Calculate i) Line current and Slip, ii) Rotor cu losses, iii) mechanical power output iv) Efficiency. (8)

15. a) i) Explain the operation of a single phase Induction motor using double revolving field theory. (8)

ii) Draw the equivalent circuit of single phase induction motor and discuss the experimental procedure to obtain its parameters. (8)

(OR)

b) i) Discuss the different methods of starting the single phase induction motor. (8)

ii) Describe the construction and operation of shaded pole induction motor? (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18ME402 – Applied Thermodynamics

(Approved Refrigeration Table & Psychrometric Chart may be provide)

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What are the parameters affect the thermal efficiency of an Otto cycle?
2. List the differences between actual and theoretical PV diagram of four stroke engine.
3. Categorize the classification of an IC engine.
4. Define the term knocking.
5. What is critical pressure ratio?
6. Differentiate impulse and reaction turbine.
7. What are the important applications of compressor?
8. Define the volumetric efficiency of a compressor.
9. Define COP.
10. What is sensible heating and cooling?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive the expression for air standard efficiency of a diesel cycle. (8)

ii) Derive the expression for air standard efficiency of a dual cycle. (8)

(OR)

b) i) A diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6% of stroke. Find the air standard efficiency of the engine. Take γ for air as 1.4. (8)

ii) Air enters the compressor of a gas turbine plant operating on Brayton cycle at 101.325 kPa, 27°C. The pressure ratio in the cycle is 6. Calculate the maximum temperature in the cycle and the cycle efficiency. Assume WT = 2.5 WC, where WT and WC are the turbine and the compressor work respectively. Take γ = 1.4. (8)

12. a) i) Describe the opening and closing of values using valve timing diagram. (8)

ii) With neat sketch explain the working of four stroke petrol engine. (8)

(OR)

b) i) What is splash Lubrication system? Explain. (8)

ii) List the types of cooling system and explain any one type with neat diagram. (8)

13. a) i) A large tank contains air at 284 kN/m^2 gauge pressure and 24°C temperature. The air flows from the tank to the atmosphere through a convergent nozzle. If the diameter at the outlet of the nozzle is 20 mm, find the maximum flow rate of air. Take: R = 287 J/kg K, γ = 1.4 and atmospheric pressure = 100 kN/m^2. (8)

ii) Explain velocity diagram of simple and multistage turbines. (8)

(OR)

b) i) What is compounding in a turbine? Describe pressure compounding with neat sketch. (8)

ii) What is governing? Explain the working of any one type of governing. (8)

14. a) i) Explain the working of single stage reciprocating compressor. (8)

ii) Explain the mechanism used in compressor to dissipate heat generate during compression. (8)

(OR)

b) i) A single stage reciprocating air compressor is required to compress 75m^3 of air per minute from 15°C and 1 bar to 8 bars. Find the temperature at the end of compression, work done, heat rejection during i) isothermal process and ii) adiabatic process. (8)

ii) A centrifugal compressor delivers 18 kg/s of air with a total head pressure of 4:1 The speed of a compressor is 15000 rpm. Total head temperature at the inlet is 22°C, slip factor 0.9, power input factor 1.05, and isentropic efficiency 0.85 Calculate the diameter of the impeller and the power input. (8)

15. a) i) Describe vapour compression refrigeration system with neat diagram. (8)

ii) A refrigerating system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35°C and the lower temperature is – 15°C. The capacity is to be 12 tonnes. Neglect all losses. Determine : (8)

i) Co-efficient of performance

ii) Heat rejected from the system per hour

iii) Power required.

(OR)

b) i) The atmospheric conditions are; 20°C and specific humidity of 0.0095 kg/kg of dry air. Calculate the following : (8)

i) Partial pressure of vapour

ii) Relative humidity

iii) Dew point temperature.

ii) 120 m^3 of air per minute at 35°C DBT and 50% relative humidity is cooled to 20°C DBT by passing through a cooling coil. (8)

Determine the following :

i) Relative humidity of out coming air and its wet bulb temperature

ii) Capacity of cooling coil in tonnes of refrigeration

iii) Amount of water vapour removed per hour.

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IV Semester (Full Time)

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METALLURGICAL ENGINEERING

18MT402 – Phase Transformation

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by super cooling?
2. What is eutectic solidification?
3. Recall homogeneous nucleation.
4. Mention the various stages in nucleation and growth of crystals.
5. How spinodal transformations differ from other type of transformations?
6. What is uphill decomposition?
7. Recall particle coarsening.
8. List the advantages of cold working.
9. Why martensite transformation is termed as diffusion less transformation?
10. Give two shape memory alloys with applications.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)		Summarize the phenomena of constitutional super cooling with a neat sketch.	(16)
			(OR)	
	b)		Demonstrate the solidification process during quenching from melt.	(16)
12.	a)		Derive an expression for critical radius and critical free energy when a spherical particle nucleates homogeneously from the melt.	(16)
			(OR)	
	b)		Describe Nucleation rate, Growth rate and interface controlled growth.	(16)
13.	a)	i)	Illustrate the mechanism of pearlite growth with relevant sketches.	(8)
		ii)	Derive the Avrami equation and mention its applications.	(8)
			(OR)	
	b)		Summarize the order-disorder transformations with suitable examples.	(16)

14. a) Analyze the Recovery, Recrystallization and Grain growth mechanisms. (16)

(OR)

b) i) Summarize the structure and properties of cold worked metals. (8)

ii) Compare Hot working and Cold working processes. (8)

15. a) Illustrate the martensite transformation in steel with reference to characteristic features, morphology, crystallography and reversibility with relevant sketches. (16)

(OR)

b) i) Describe the Martensite in nonferrous systems. (8)

ii) Demonstrate the principles of thermo elastic martensite. (8)

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VI Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME601 – Engineering Economics and Financial Management

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define marginal revenue.
2. What is sunk cost?
3. What is significance of sinking fund factor?
4. How the Effective interest rate differs from the nominal interest rate?
5. Write short notes on Fund Flow Technique.
6. Compare present worth method and annual equivalent method in cash flow analysis.
7. State the objectives of financial management.
8. Define working capital?
9. What are the limitation of ratio analysis?
10. What is the need of the systems of book keeping?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) ABC company Limited having following details (16)

Fixed cost= Rs 50,00,000

Variable cost per unit= Rs 400

Selling price per unit=Rs 600

Find

i) The break-even sales quantity

ii) The break-even sales

iii) The actual production quantity is Rs 1,40,000. Find the following:

a) Contribution

b) Margin of safety by all methods.

(OR)

b) i) Explain the Law of Supply and Demand. (8)

ii) Explain the Concept of Engineering Economics in terms of engineering efficiency and economic efficiency. (8)

12. a) i) How make or buy decision are useful in value engineering? (8)

ii) What is value engineering? With a suitable example, explain the various phases of value engineering job plan. (8)

(OR)

b) Mr. Bean Is Planning for his retried life. He has 8 more years of service. He would like to deposit 20% of his salary, which is Rs 10,000 at the end of first year and thereafter he wishes to deposit every year with an annual increase Rs 2000 for the next 9 years. At an interest rate of 20%. Find the total amount at end of the 10^{th} year at which time he retires. (16)

13. a) Discuss the Annual Equivalent Method of cost dominated cash flow diagram. (16)

(OR)

b) The cost of erecting an oil well is Rs 1, 50, 00, 000. The annual equivalent yield from the oil well is Rs 3, 00, 000. The salvage value after its useful life of 10 years is Rs.2, 00, 000. Assuming an interest rate of 18%, compounded annually, find out the erection of the oil well is financially is feasible, based on the present worth method. (16)

14. a) i) Explain the different sources of finance in detail. (8)

ii) Explain the method management of working capital. (8)

(OR)

b) Explain the different methods of appraising project profitability. (16)

15. a) Explain the following financial statement (16)

i) Balance sheet

ii) Income statement.

(OR)

b) Explain the types of ratio, significance and its limitation in financial analysis. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE601 – Microprocessor and Microcontroller

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. List the features of 8085 Microprocessor.
2. Compare memory mapped I/O and I/O mapped I/O systems.
3. Write the instruction format for MOV DS, AX instruction.
4. Mention the different functions of BIU.
5. Differentiate Microprocessor and Microcontroller.
6. What is the use of UART?
7. What are the needs of interfacing IC's?
8. Give the usage of sample and hold IC.
9. Write the Bit set/reset control word format of 8255.
10. Tell some of applications of 8279 interfacing IC.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the architecture of 8085 with its neat sketch and mention hardware features. (16)

(OR)

b) Explain the different types of interrupts in 8085. Microprocessor with interrupt structures. (16)

12. a) i) Illustrate different addressing modes of 8086. (8)

ii) Explain the various components of EU in 8086 microprocessor. (8)

(OR)

b) i) Describe the exception handling mechanism of 8086. (8)

ii) Illustrate multi processor mode of operation of 8086. (8)

13. a) Mention the different features of 8051. With neat block diagram, explain its architecture. (16)

(OR)

b) i) Explain the Timer/Counter module in 8051 microcontroller. (8)

ii) Write 8051 program to add two 16 bit numbers. (8)

14. a) Draw the Interface diagram for the following devices with 8051. (16)

i) DIP switch matrix keyboard

ii) Seven segment LEDs.

(OR)

b) Interface of A/D and D/A converter IC's with 8051. (16)

15. a) With neat block diagram, explain different modes of operation and programming modes of 8255 IC and its interfacing with 8085 in both Modes 0 with an example programme. (16)

(OR)

b) i) Explain the need of 8257 Interfacing IC with its functional block diagram. (8)

ii) Demonstrate the operating modes of 8279 IC. (8)

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VI Semester (Part Time)

(2016 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

16PTEC601 – Optical Communication

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Compare step index and graded index fibers.
2. Define linearly polarized mode.
3. List the factors that cause Rayleigh scattering in optical fibers.
4. Differentiate material dispersion and waveguide dispersion.
5. Define quantum efficiency of LED.
6. Brief about the temperature effects in optical sources.
7. Write the importance of intrinsic layer in PIN diode.
8. Define detector response time.
9. Enumerate the various SONET/SDH layers.
10. Write short notes on WDM.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Discuss about light wave communication with its advantages and disadvantages. With neat block diagram explain the key elements of optical fiber system. (16)

(OR)

b) Explain the phenomenon of total internal reflection using Snell's law with figures and calculations. (16)

12. a) Describe the absorption, scattering and bending losses in optical fibers. (16)

(OR)

b) Briefly explain inter and intramodal dispersion and bring out the differences between intra and intermodal dispersion. (16)

13. a) Explain the construction and working of surface emitting LED and deduce the expression for the internal quantum efficiency of LED. (16)

(OR)

b) Draw and explain the structure of Fabry-Perot resonator cavity for a laser diode. Derive laser diode rate equations. (16)

14. a) Draw the structure and describe the operation of Avalanche photo diode. And also illustrate the three factors that decides the response time of photo diodes with neat sketches. (16)

(OR)

b) List the types of optical amplifiers. Discuss in detail about Erbium doped fiber amplifier. (16)

15. a) Explain the layered architecture of SONET/SDH with necessary diagram. (16)

(OR)

b) i) Enumerate the optical power measurements with neat diagrams. (8)

ii) Summarize the industrial applications of optical fibre sensors. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE601 – Environmental Engineering - II

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Distinguish between 'sewage' and 'storm water.
2. List out the test on sewer.
3. Write down the significance of BOD.
4. Classify the types of sedimentation tank.
5. Define recirculation ratio.
6. What is the effluent disposal system?
7. Write the need of sludge digestion.
8. Mention the functions of flushing cistern.
9. What do you mean by dilution factor?
10. Define eutrophication.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	i)	Describe the systems of sewerage with its merits and demerits.	(8)
		ii)	Classify the shapes of sewer pipes.	(8)
			(OR)	
	b)	i)	Enumerate the various joints used for sewer.	(8)
		ii)	Illustrate the various types of pumps.	(8)
12.	a)		Discuss the composition and characteristics of sewage.	(16)
			(OR)	
	b)	i)	Elaborate skimming tank with neat sketches.	(8)
		ii)	Classify the types of screens.	(8)
13.	a)		Summarize the principles, functions, design of units Trickling filter with neat sketch.	(16)
			(OR)	
	b)	i)	Discuss about lagoons.	(8)
		ii)	Demonstrate Septic tank in detail.	(8)

14. a) i) Sketch sludge drying beds with its function. (8)

ii) Make a note on sludge thickening. (8)

(OR)

b) Examine the systems of plumbing with its pros and cons. (16)

15. a) i) Draw oxygen deficit curve with its significance. (8)

ii) Discuss wastewater reclamation techniques. (8)

(OR)

b) i) Explain about deep well injection. (8)

ii) Write a note on sewage sickness. (8)

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B.E. Degree Examinations – April/May 2022

V Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18CSOE01 – Object Oriented Programming Using C++

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Compare Procedure oriented programming and Object Oriented programming.
2. List out the benefits of Object Oriented Programming.
3. How will you create object and access the members? Give example.
4. List out the operators which cannot be overloaded using friend function.
5. Mention the access specified and its uses.
6. What is meant by pure abstract class?
7. What do you mean by the term 'Generic Programming'?
8. Differentiate between Exception and Error.
9. What is stream? Which C++ stream classes handles the data received through keyboard?
10. Define manipulator. List out the manipulators available in C++.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the basic Concepts of Object Oriented programming. (10)

ii) Describe the C++ program structure. (6)

(OR)

b) i) Write a C++ Program to find the area of the square, rectangle, circle using function overloading. (10)

ii) Illustrate the Object Oriented Programming paradigm. (6)

12. a) i) Write a C++ program to manage a bank account using classes and objects. (8)

ii) Write short notes on casting primitive data types to object type and vice versa with an example for each. (8)

(OR)

b) i) Explain in detail about various types of constructors with suitable example. (8)

ii) Write a program to overload the '+' operator using friend function. (8)

13. a) Discuss the various types of inheritance that are available in C++ with neat diagram. (16)

(OR)

b) i) How will you implement runtime polymorphism? Illustrate with suitable example program. (8)

ii) Explain the virtual base class with suitable example program. (8)

14. a) Explain in detail about function template and class template with suitable example. (16)

(OR)

b) Illustrate the Exception handling mechanism with suitable example program. (16)

15. a) i) Explain stream class hierarchy in detail. (8)

ii) Explain the formatted and unformulated I/O functions with example. (8)

(OR)

b) i) Write a program to store the student details into a file and read the student details from the file and display. (8)

ii) Describe the different file opening modes available in C++. (8)

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B.E. Degree Examinations – April/May 2022

III Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18EE303 – DC Machines and Transformers

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Distinguish between statically and dynamically induced EMF.
2. Define 'Coercitity'.
3. List any four applications of D.C generator.
4. What are the functions of commutator in a DC machine?
5. Why dc series motor is never started on no-load?
6. What is the significance of back EMF?
7. Draw a phasor diagram of a transformer under loaded condition.
8. List the types of three-phase transformer connections.
9. What are the conditions for maximum efficiency for DC machines and transformer?
10. Define 'all day efficiency' of a transformer.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the concept of field energy and co energy of magnetic field system. (8)

ii) Discuss the AC operation of Magnetic circuits in detail. (8)

(OR)

b) i) Explain in detail about magnetically induced EMF and force and derive the relevant expressions. (8)

ii) Write short notes on multiply excited magnetic system. (8)

12. a) i) Derive the EMF equation of DC generator. (8)

ii) Explain the effect of armature reaction in a DC shunt generator. How is its demagnetizing and cross-magnetizing ampere turns calculated? (8)

(OR)

b) i) A 4 pole DC Shunt Generator with lap connected armature supplies 5 kilowatt at 230 Volts. The armature and field copper losses are 360 Watts and 200 Watts respectively. Calculate the armature current and generated EMF. (8)

ii) Explain the parallel operation of DC generator with neat diagram. (8)

13. a) i) Derive the torque equation and draw speed versus torque characteristics of DC shunt motor. (8)

ii) A 200 V DC series motor runs at 500 rpm when taking a line current of 25 A. The resistance of the armature and field windings are 0.3 ohm and 0.5 ohm respectively. If the current taken remains constant, calculate the resistance necessary to reduce the speed to 350 rpm. (8)

(OR)

b) i) Explain functions of the 4-point starter in detail with neat sketch. (8)

ii) Explain a speed control method of DC shunt motor which will control the motor above rated speed. Mention its advantages and limitations. (8)

14. a) i) Explain the construction, working principle and operation of a transformer. (8)

ii) A 40 kVA, single phase transformer has 400 turns on primary and 100 turns on the secondary. The primary is connected to 2000 V, 50 Hz supply. Determine secondary voltage, full load primary, secondary currents and maximum value of flux. (8)

(OR)

b) i) Write short notes on 'autotransformer and its principle'. Derive an expression for saving of copper. (8)

ii) Mention the merits and demerits of various connections of three phase transformers. (8)

15. a) i) With neat circuit diagram, explain how you will conduct Swinburne's test. Also calculate the efficiency when the DC machine is running as a motor. (8)

ii) Describe with neat sketch, how Hopkinson's test is performed on a DC machine? (8)

(OR)

b) i) Explain how the efficiency of a single phase transformer is estimated from the open circuit and short circuit tests. (8)

ii) A 15 kVA, 2000/200 V transformer has an iron loss of 250 W and full-load copper loss of 350 W. During the day it is loaded as follows. (8)

No of hours	Load	Power factor
9	¼ load	0.6
7	Full load	0.8
6	¾ load	1.0
2	No load	-

Calculate the all-day efficiency.

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B.E. Degree Examinations – April/May 2022

III Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18ME302 – Engineering Mechanics

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Distinguish that collinear and coplanar force.
2. How do you understand that the given particle is in equilibrium?
3. Show the difference between roller support and hinged support.
4. State the varignon's principle.
5. What do you understand by axes of reference?
6. State the theorem of parallel axis.
7. How do you classify the laws static friction and dynamic friction?
8. What is a wedge?
9. Define time of flight of a projectile.
10. Write impulse-momentum equation.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Two identical rollers, each of weight 50N are supported by an inclined plane and a vertical wall as shown in figure.1. Find the reactions at the points of supports. Assume all the surfaces are smooth. (16)

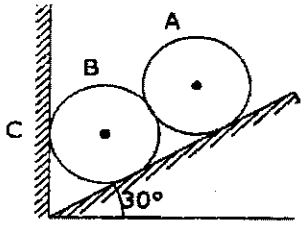

Figure.1.

(OR)

b) The lines of action of three forces are concurrent at the origin 'O' passes through the points A, B and C having coordinates, (3,0,-3), (2,-2,4) and (-1,2,4) respectively. If the magnitude of the forces are 10N, 30N, and 40N. Determine the magnitude and direction of their resultant. (16)

12. a) Calculate the support reactions of the beam shown in figure.2. (16)

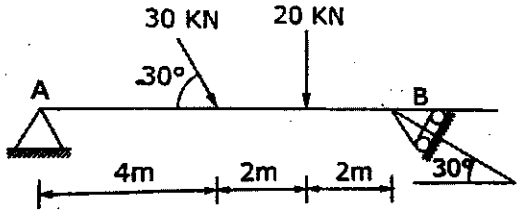

Figure.2.

(OR)

b) ABCD is a weightless rod under the action of four forces P = 10N, Q = 4 N, S = 8 N and T = 12 N as shown in figure.3. Calculate the resultant and mark the same in direction with respect to the end A of the rod. (16)

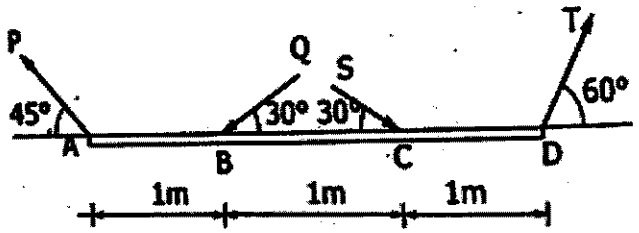

Figure.3.

13. a) Analyze the centre of gravity of L-section shown in figure.4. (16)

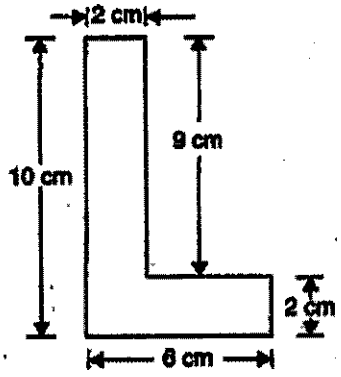

Figure.4.

(OR)

b) Find the moment of inertia of a T section of flange 100 mm X 30 mm and web 20 mm X 80 mm about its centroidal axes. (16)

14. a) An effort of 200 N is required just to move a certain body up an inclined plane of angle 15°, the force acting parallel to the plane. If the angle of inclination of the plane is made 20°, the effort required again applied parallel to the plane, is found to be 230 N. Find the weight of the body and the co-efficient of friction. (16)

(OR)

b) A uniform ladder of weight 200 N of length 4.5 m rests on a horizontal ground and leans against a rough vertical wall. The co-efficient of friction between the ladder and the floor is 0.4 and between ladder and vertical wall is 0.2. When a weight of 990N is placed on the ladder at a distance of 1.2m from the top of the ladder, the ladder is at the point of sliding. Find: (16)

i) The angle made by the ladder with horizontal

ii) Reaction at the foot of the ladder and

iii) Reaction at the top of the ladder.

15. a) A particle moves along a straight line so that its displacement in metre from a fixed point is given by $s = t^3 + 3t^2 + 4t + 5$. Find: (16)

i) Velocity at start and after 4 seconds

ii) Acceleration at start and after 4 seconds.

(OR)

b) A ball of mass 20 kg moving with a velocity of 5 m/s strikes directly another ball of mass 10 kg moving in the opposite direction with a velocity of 10 m/s. If the coefficient of restitution is equal to 5/6, then determine the velocity of each ball after impact. (16)

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VII Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MEOE05 – Professional Ethics and Human Values

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is courage as a value?
2. How are values and skills complementary?
3. List some of the Models of Professional Roles.
4. Give the general criteria to become a Professional engineer
5. Compare engineering experiments with standard experiments.
6. List out the uncertainties occur in the model designs.
7. Differentiate a copy right and a patent.
8. Distinguish Institutional authority and Expert authority.
9. Give the skills required for an engineer to handle moral problems.
10. What is computer ethics?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) How character is formed? Explain the essence of Indian spirituality. (16)

(OR)

b) What are fundamental values? How do they guide personal life? (16)

12. a) An engineer has to play different roles in his profession. Do ethics help him in being honest and maintain values? Discuss. (16)

(OR)

b) Discuss the moral issues that engineer faces at the design stage of the product. (16)

13. a) Discover how Engineering project differ from standard experimentation. (16)

(OR)

b) "If engineering is a social experimentation, engineers are guardians of public interest"- Discuss. (16)

14. a) Explain the elements of intellectual property rights in details and benefits of IPRS. (16)

(OR)

b) Explain the expected confidentiality to be maintained by the engineer while he shifts to another organization similar in services as the previous one. (16)

15. a) Compose the issues related to computer ethics an interest with your personal Experience. (16)

(OR)

b) Justify engineers as expert witness and advisors with suitable examples. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18ME602 – Finite Element Analysis

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Why polynomial type interpolation functions are mostly used in FEM?
2. State the properties of Stiffness matrix.
3. Distinguish between essential boundary conditions and natural boundary conditions.
4. Write down the expression of stiffness matrix for a truss element.
5. What is meant by plane stress and plane strain analysis?
6. Distinguish between constant strain triangular (CST) and linear strain triangular (LST) element.
7. What is the purpose of Isoparametric elements?
8. Write down Gaussian quadrature for numerical integration.
9. Write down the expression for one dimensional heat conduction with free end convection.
10. Write down the expression for stiffness matrix in two-dimensional heat conduction and convection.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) The following differential equation is available for a physical phenomenon. (16)

$d^2y/dx^2 + 50 = 0$, $0 \leq x \geq 10$

Trail function is , $y = a_1 x (10 - x)$

Boundary conditions are, $y(0) = 0$, $y(10) = 0$

Find the value of the parameter a_1 by the following methods

i) Point collocation;

ii) Subdomain collocation.

(OR)

b) A simply supported beam subjected to uniformly distributed load over entire span as shown in Figure.1. Determine the bending moment and deflection at mid span by using Rayleigh-Ritz method and compare with exact solutions. (16)

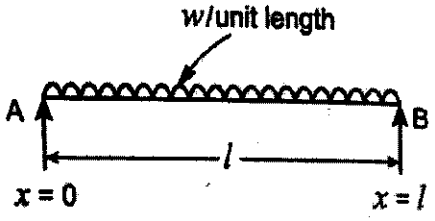

Figure.1.

12. a) An axial load of 4 x 10^5 N is applied at 30°C to the rod as shown in figure.2. The temperature is then raised to 60°C. Calculate the following: (16)

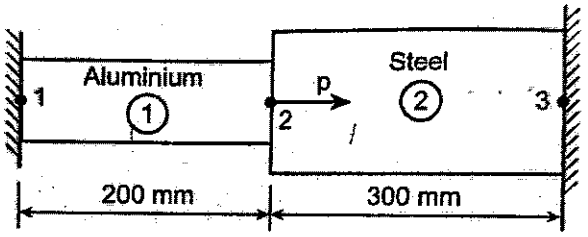

Figure.2.

i) Assemble the K and F matrices.

ii) Nodal displacements.

iii) Stresses in each material.

iv) Reactions at each nodal point.

(OR)

b) Consider a three bar truss as shown in figure.3. Take E = 2 x 10^5 N/mm^2. Calculate the stiffness matrix. Take A_1 = 2000 mm^2, A_2 = 2500 mm^2, A_3 = 2500 mm^2. (16)

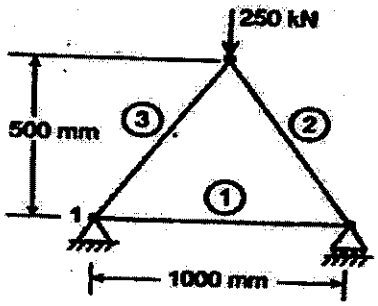

Figure.3.

13. a) Derive the shape function derivation for the constant strain triangular (CST) element. (16)

(OR)

b) For the axisymmetric elements shown in figure.4. Determine the element stresses. Let Young's Modulus (E) = 210 Gpa and poison ratio (υ) = 0.25. The coordinates (in millimeters) are shown in figure.4. (16)

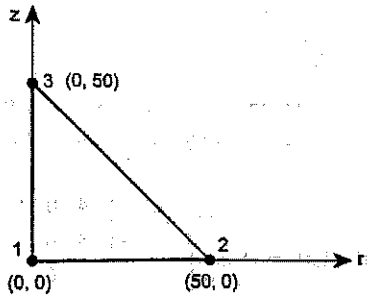

Figure.4.

The nodal displacements are:

u_1 = 0.05 mm; u_2 = 0.02 mm; u_3 = 0 mm; w_1 = 0.03 mm; w_2 = 0.02 mm; w_3 = 0 mm.

14. a) For the isoparametric quadrilateral element shown in figure.5. Determine the local coordinates of the point P which has Cartesian coordinates (7, 4). (16)

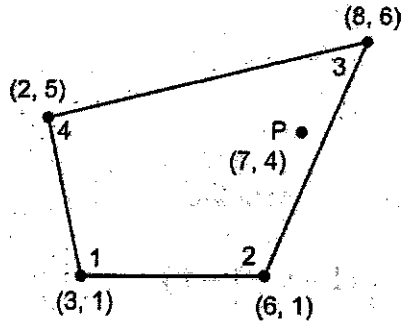

Figure.5.

(OR)

b) Evaluate the integral I = $\int_{-1}^{1}(x^2 + \cos(\frac{x}{2}))dx$ by using three point Gaussian quadrature and compare with exact solution. (16)

15. a) Calculate the temperature distribution in a one dimension fin with physical properties given in figure. The fin is rectangular in shape and is 120 mm long, 40 mm wide and 10 mm thick. Assume that convection heat loss occurs from the end of the fin. Use two elements. Take k = 0.3 W/mm°C; h = $1x10^{-3}$ W/mm²°C, T_∞ = 20°C. (16)

(OR)

b) Compute the element matrix and vectors for the element shown in figure.6. When the edges 2-3 and 3-1 side convection heat loss. (16)

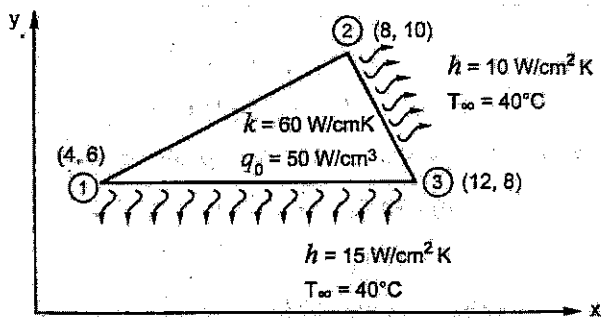

Figure.6.

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

COMPUTER SCIENCE AND ENGINEERING

18CS602 – Web Technology

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by DTD in XHTML? Give its syntax.
2. Give the syntax of image maps with an example.
3. List the properties of style tag.
4. Mention the various Java script object models.
5. What is meant by Event bubbling?
6. Compare JSP with Servlets.
7. Define a cookie.
8. What are the advantages of schema over DTD?
9. Define XML schema.
10. Write short notes on WSDL.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain HTTP Request and Response Message. (8)

ii) Explain in detail about various protocols used in web technology. (8)

(OR)

b) i) Write a HTML code for designing a registration form for the online railway ticket reservation. (8)

ii) To create an html page with different types of frames such as floating frame, navigation frame and mixed frame. (8)

12. a) i) Explain in detail about all the types of Cascading Style sheet with an example Program and List the different selectors available in CSS and explain in detail. (8)

ii) Illustrate CSS Box Model with suitable diagram and discuss the different types of Positioning in CSS beyond the normal flow layout with an example for each. (8)

(OR)

b) i) Explain the various event handlers in Java script. Write a Java script program to develop the arithmetic calculator. (10)

ii) Design a web page with a text box (username) where the user can enter a name and another text box (ID) where the user enter an only four digit ID.NO and a button "validate". Validate the entered username and ID field for the following using java script. (6)

i) Both the fields should not be empty

ii) ID field should have numeric

iii) Name field should have alphabets.

13. a) i) Explain Intrinsic Event Handling with suitable example program. (8)

ii) Discuss about DOM Tree and DOM Event Handling. (8)

(OR)

b) i) What are servlets? How can you deploy a simple servlet? Explain with example. (8)

ii) Explain the architecture of Java Servlet. (8)

14. a) i) Describe XSLT and XPATH. (8)

ii) What is a DTD (document Type Definition)? What are its applications? Write a XML schema for a Movie data base table with the following structure: Movie (name, director, date released, and record), name (firstname, midname, lastname), date_released (date, month, year) Create a XML document to store voter ID, voter name, address and date of birth details. Create a DTD to validate the document. (8)

(OR)

b) Write a client server JSP program to find simple interest and display the result in the client. (16)

15. a) Elaborate on XML-RPC. (16)

(OR)

b) Explain the SOAP Protocol, its message structure with a messaging example. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18EC602 – Embedded Systems

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. List any four applications of handheld embedded devices.
2. Compare and contrast about soft real time embedded system and hard real time embedded system.
3. Examine the counter value of a timer for a clock rate of 16x the baud rate.
4. Recommend an approximate value of I^2C bus capacitance to transfer data.
5. Construct a finite state machine for seat belt control.
6. Infer your idea to minimize the drawbacks of waterfall model.
7. Select the best semaphore for queuing process and Justify.
8. Identify the scheduling algorithms for real time embedded applications.
9. Find the number of pixels cells of an image with 256 x 256.
10. Relate the sensors and its uses in vehicle cruise control.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the structural units in embedded system with a neat block diagram. (8)

ii) Name the types of embedded system with various aspects and summarize each with an example. (8)

(OR)

b) i) Infer the uses of in circuit emulator to develop any one embedded system application. (8)

ii) Relate the steps used in device programmer to develop application code for any one processor/controller. (8)

12. a) i) Compare and contrast about serial bus and parallel bus. (8)

ii) List the types of ports, select the port to interface I/O devices and brief about the interfacing procedure. (8)

(OR)

b) i) Explain the features and frame format of CAN bus with neat diagram. (8)

ii) What are the concepts behind data transmission in I^2C and brief the flow control with necessary diagrams? (8)

13. a) i) Build any one embedded system using co-design development process. (8)

ii) Examine the pros and cons of Embedded product Development Life Cycle (EDLC) management phases to build a house. (8)

(OR)

b) i) Utilize the phases of EDLC in the lifetime of an embedded product and brief each with suitable diagram. (8)

ii) Distinguish between the life cycle models and examine the development process with neat diagram. (8)

14. a) i) Select a scheduling algorithm of n-tasks with same priority and equal execution time and explain its concepts briefly with suitable diagram. (8)

ii) What do you mean by task and its states and draw its state diagram? (4)

iii) Summarize the concepts of memory management in a task with its services. (4)

(OR)

b) i) Relate the semaphore with message mailbox and message queue with a neat state diagram. (4)

ii) Outline the concepts of priority inversion problem. (4)

iii) Utilize the concepts of pre-emptive and non pre-emptive scheduling algorithm with neat timing diagram to develop a embedded system. (8)

15. a) i) Inspect the tasks available in development of Digital camera and brief about class diagram. (8)

ii) Select the ISO layer for Digital camera to develop architecture. (4)

iii) Minimize the task utility for synchronization of Digital camera with neat diagram. (4)

(OR)

b) i) Divide the main task into subtask of a smart card and examine the concepts of task synchronization model with suitable diagram. (8)

ii) Design and develop smart card hardware system with a neat diagram. (4)

iii) Prioritize the task functions and its working flow in smart card. (4)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18EE602 – Electrical Drives and Control

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Give and Label the block diagram of electrical drive Systems.
2. List out advantages of armature control for speed control of DC motor.
3. What is function of current controller in closed loop speed control system?
4. What are the applications of chopper fed DC drives?
5. What type of drive used for fan and pump loads? Why?
6. What is meant by frequency control of Induction Motor?
7. How space vector modulation is superior to sinusoidal modulation?
8. Give the advantages of vector control method.
9. Mention disadvantage of rotor resistance control.
10. What is meant by slip power Recovery scheme?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain any two speed control method used in DC shunt motor with neat sketch. And draw the speed-torque characteristic at different opening points. (16)

(OR)

b) i) Explain the steady state analysis of chopper fed separately excited DC motor Drive for continuous current mode. (10)

ii) A 230V, 500rpm, 90A separately excited dc motor has the armature resistance and inductance of 0.115Ω and 11mH respectively. The motor is controlled by a chopper operating at 400Hz. Calculate the motor speed for a motoring operation at δ = 0.5 and half of rated torque. (6)

12. a) i) Describe in detail about the four quadrant operation of chopper fed DC drive. (8)

ii) Derive and Explain from basic principles the transfer function for separately excited DC motor system with converter fed armature control. (8)

(OR)

b) i) Explain Control structure of DC motor with inner current loop and outer speed loop. (8)

ii) Describe the step by step procedure for design of current controller fed DC motor. (8)

13. a) i) Draw and Explain the equivalent circuit of Induction motor with torque and speed characteristics. (10)

ii) Write merits and application of Induction motor with variable voltage control. (6)

(OR)

b) i) Describe the speed torque characteristics of Induction motor with variable voltage and frequency control. (10)

ii) Mention disadvantages of variation of frequency method. (6)

14. a) Analyze the operation of Voltage source inverter fed Induction motor drives with space vector modulation. (16)

(OR)

b) Explain the closed loop operation of Induction motor drive with constant V/F control strategy. (16)

15. a) i) Explain in detail static rotor resistance method of speed control of a slip ring induction motor. (12)

ii) List the advantages and disadvantages of static rotor resistance control. (4)

(OR)

b) i) Describe the operation and analysis of static scherbius drive and also draw its speed torque characteristics. (12)

ii) Compare merits and demerits of static scherbius and static kramer drives. (4)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MT602 – Forming Process

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Justify flow stress of the metal increases with increasing strain rate.
2. Give the effect of lubricant on friction developed between work piece and the forming tools.
3. What is fullering?
4. Give the specifications of the sheet and strip.
5. Mention the application of direct extrusion process.
6. Give the characteristic of the wire continuous mills.
7. Mention suitable forming operations for the Flanged Cylinders and Honey comb panels like aircraft wings.
8. State the stretch forming operations disadvantages.
9. List any four advantages of powder metallurgy.
10. Mention any three powder metallurgy products.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the forming load calculating by slab analysis. (16)

(OR)

b) i) Distinguish hot working and cold working processes. (8)

ii) Derive Von Mises Yield Criteria. (8)

12. a) Explain the types of presses and hammers used in forging. (16)

(OR)

b) i) Illustrate the constructions of the two high rolling mill and four-stand continuous mill and planetary mill. (10)

ii) Analyze the causes and remedies of the following rolling defects. (6)

i) Centre splits

ii) Alligatoring.

13. a) i) Distinguish direct and indirect extrusion processes. (8)

ii) State and explain the process of producing collapsible toothpaste tubes. (8)

(OR)

b) i) Explain with neat sketch of a draw bench and cross section of a drawing die. (8)

ii) Brief patenting of the low carbon steel. (8)

14. a) Explain the various high velocity forming methods. (16)

(OR)

b) Discuss the stretch forming, spinning and deep drawing methods. (16)

15. a) i) Discuss atomization process of producing powders and its advantages? (8)

ii) Brief hot isostatic pressing (HIP) and roll compacting methods of powder compaction. (8)

(OR)

b) i) Discuss various stages of manufacturing sintered friction materials. (8)

ii) Discuss the production of cemented carbide tools. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

CIVIL ENGINEERING

18CE602 – Foundation Engineering

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Distinguish between Representative and Non-Representative Samples.
2. Define Area ratio.
3. Compare general and local shear failure.
4. Formulate the equation used to determine the immediate settlement.
5. Identify the methods to determine the load carrying capacity of a pile.
6. Define negative skin friction.
7. Classify the methods of analysis for stability of a finite slope.
8. Enumerate the basic types of failure of a finite slope.
9. Write down the assumptions of Rankine's Earth Pressure theory.
10. Explain the term critical depth of vertical cut for a clay soil.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the procedure for performing Standard penetration Test along with necessary corrections and limitations. Also list out its uses. (16)

(OR)

b) Explain with neat sketches, the various types of shallow and deep foundations and state when they are suitable. (16)

12. a) A strip footing 2 m wide carries a load intensity of 400 kn/m^2 at a depth of 1.2 m in sand. The saturated unit weight of sand is 19.5 kN/m^3 and unit weight above water table is 16.8 kN/m^3. The shear strength parameters are c = 0 and ϕ = 35^o. Determine the factor of safety with respect to shear failure for the following cases of location of water table: (16)

i) Water table is 4 m below GL.

ii) Water table is 1.2 m below GL.

iii) Water table is 2.5 m below GL.

iv) Water table is 0.5 m below GL.

v) Water table is at GL itself. Use Terzaghi's equations.

(OR)

b) Explain in detail the Plate Load Test for determining the Bearing Capacity of foundation and how do you estimate the settlement of a footing on sand using the results of plate load test? (16)

13. a) Discuss the method of obtaining ultimate load and also allowable load on pile from pile load test. (16)

(OR)

b) A reinforced concrete pile weighing 30 kN (inclusive of helmet and dolly) is driven by a drop hammer weighing 40 kN and having an effective fall of 0.8 m. The average set per blow is 1.4 cm. The total temporary elastic compression is 1.8 cm. Assuming the coefficient of restitution as 0.25 and a factor of safety of 2; determine the ultimate bearing capacity and the allowable load for the pile. (16)

14. a) A slope is to be constructed in a soil for which c = 0 and φ = 360. It is to be assumed that the water table may occasionally reach the surface of the slope with seepage taking place parallel to the slope. Determine the maximum slope angle for a factor of safety 1.5, assuming a potential failure parallel to the slope. What would be the factor of safety of the slope constructed at this angle, if the water table should be well below the surface? The saturated unit weight of the soil is 19 kN/m^3. (16)

(OR)

b) Explain Swedish circle method of analysis of slope stability. (16)

15. a) A retaining wall 10 m high retains a cohesionless soil having an angle of internal friction of 30^o. The surface of the soil is level with the top of the wall. The top 3 m of the fill has a unit weight of 20 kN/m^3 and that of the rest is 30 kN/m^3. Find the magnitude per meter run and point of application of the resultant active thrust. Assume ϕ the same for both the strata. (16)

(OR)

b) For an earth retaining wall shown in figure.1, sketch the earth pressure diagram under the active state and find the total thrust (per unit length of the wall) and its location. (16)

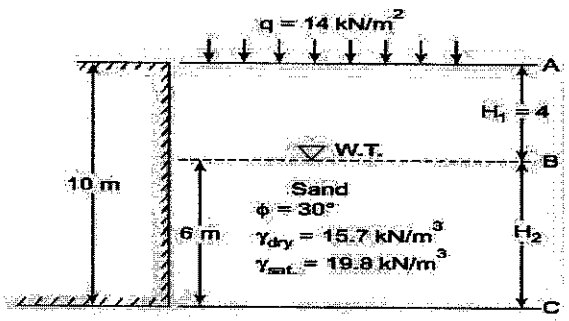

Figure.1.

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

16PTEE401 – Linear Integrated Circuits

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention the advantages of integrated circuits over discrete components.
2. List the basic processes involved in fabricating ICs using planar technology.
3. Give the ideal characteristics of Operational amplifier.
4. Write the limitations of the basic differentiator circuit.
5. List the features of instrumentation amplifier.
6. Point out some of the non – linear applications of op-amps.
7. Specify the applications of 555 timer circuit in monostable mode of operation.
8. What is the use of PLL in Ic 555?
9. Mention the uses of opto-coupler.
10. Draw the circuit of LM380 power amplifier.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) With neat sketch explain the basic steps involved in the fabrication of integrated circuits. (16)

(OR)

b) Explain in detail the classification of integrated circuit. Also point out the merits and demerits of integrated circuit. (16)

12. a) With neat diagram explain the working of differential amplifier. (16)

(OR)

b) Draw the circuit of differentiator and Integrator and explain. (16)

13. a) With neat sketch explain the working of an instrumentation amplifier. (16)

(OR)

b) i) Discuss the working of sample and hold circuit with neat circuit. (8)

ii) Explain the working of any one type of digital to analog converter. (8)

14. a) Explain the function of Phase Locked Loop and derive the expression for Lock range and Capture range. (16)

(OR)

b) With neat functional diagram, explain the operation of Voltage Controlled Oscillator. (16)

15. a) Explain the features and application of LM 380 as high gain audio power amplifier. (16)

(OR)

b) Explain the construction and working principle of function generator ICL 8038. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

CIVIL ENGINEERING

16PTCE401 – Environmental Engineering - I

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention the necessity of Public Water Supply schemes.
2. Recall the factors affecting the water demand.
3. Differentiate between surface source and groundwater source.
4. Sketch the top view of the circular well.
5. Distinguish gravity conduits from pressure conduits.
6. Why Pumping Stations are required?
7. What is meant by Sedimentation?
8. Brief a note on Coagulation.
9. List any four requirements of a good distribution system.
10. Quote the various methods for detection of leakage in the underground distribution pipes.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) What is meant by water demand? State the Kuichling's formula and Freeman formula. (6)

ii) List the five types of water demand and explain them. (10)

(OR)

b) i) Define design period. Mention the five factors governing the design period. (8)

ii) Write a note on the following population forecasting methods. (8)

i) Arithmetic increase method

ii) Geometric increase method

iii) Incremental increase method.

12. a) i) Explain about the Intake Tower with a neat sketch. (8)

ii) Sketch the section and flow pattern of an infiltration gallery. (8)

(OR)

b) A 40 cm well penetrates an aquifer of 30 m thickness and the length of the strainer is 10 m. The yield is 2000 l.p.m. with a drawdown in the well of 3 m. If the length of the screen is increased to 20 m, what will be the drawdown in the well and the increase in the Specific Capacity? (16)

13. a) i) Explain about the cast iron pipes and steel pipes. (8)

ii) Write the step by step procedure for conducting the Pressure Test on the pipeline. (8)

(OR)

b) i) List the factors affecting the selection of the Pumps. (6)

ii) What is meant by the Pumping Stations? Mention the various points which are to be kept in mind while selecting a suitable site for the Pumping Stations. (10)

14. a) i) Explain about the coarse and fine screens with neat sketches (section and plan) of fixed bar type screen. (12)

ii) Give a detailed account on movable bar type screens. (4)

(OR)

b) i) Elaborate the process of boiling and addition of lime for removing Temporary Hardness. (8)

ii) Describe the Lime-Soda process for removing Hardness. (8)

15. a) i) Explain the Dead-End system with a neat sketch. (10)

ii) List the advantages and disadvantages of the Grid-Iron system. (6)

(OR)

b) i) Describe briefly about the surface/ground Reservoirs with a typical section of a ground reservoir. (8)

ii) Derive the Hardy-Cross formula of the correction for flow in Pipe Network. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Part Time)

(2016 Regulations)

MECHANICAL ENGINEERING

16PTME401 – Heat and Mass Transfer

(Use of Heat and Mass Transfer Data book is permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define fin effectiveness.
2. What is the significance of Biot number?
3. State the reciprocity theorem.
4. If an opaque surface has an absorptivity of 0.3, what will be the values of reflectivity and transmissivity?
5. Give the value of critical Reynolds number for flow over flat plate.
6. Differentiate forced and natural convection.
7. Draw the temperature profile for a counter flow heat exchanger.
8. Classify heat exchanger based on the type of heat transfer.
9. If the mole fractions of oxygen and nitrogen are 0.21 and 0.79 respectively, calculate the average molecular weight of the mixture.
10. Show the similarity of Fick's law of diffusion to Fourier equation of conduction.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Derive the general heat conduction equation in Cartesian co-ordinates. (12)

ii) A nuclear fuel element is in the form of a solid sphere of 12.5 mm radius. Its thermal conductivity is 24.2 W/mK. The heat generation rate is 50 x 10^6 W/m^3. The heat generated is absorbed by a fluid at 200°C. If the maximum temperature is limited to 360°C, determine the convection coefficient required. (4)

(OR)

b) i) Cylindrical pieces of size 60 mm dia and 60 mm height with density = 7800 kg/m^3, specific heat = 486 J/kgK and conductivity 43 W/mK are to be heat treated. The pieces initially at 35°C are placed in a furnace at 800°C with convection coefficient at the surface of 85 W/m^{2}K. Determine the time required to heat the pieces to 650°C. (12)

ii) A poker used for stirring hot coal in a furnace is in the form of a pipe of 20 mm ID and 24 mm OD. One end is at 350°C. The outside of the poker is exposed to air at 35°C with a convection coefficient of 20 W/m^{2}K. The conductivity of the material is 45 W/mK. Determine the temperature at a distance of 0.35 m from the end. (4)

12. a) i) Write short notes on i) Specular and diffuse surfaces ii) Black and gray body radiation. (8)

ii) Determine the radiation heat flux between two closely spaced, black parallel plates, radiating only to each other if their temperatures are 850 K and 425 K respectively. Recalculate the heat flux presuming that each of the parallel plates has an emissivity of 0.5. Take A = 4m^2. (8)

(OR)

b) Two very large parallel planes with emissivities 0.3 and 0.8 exchange heat. Find the percentage reduction in heat transfer when a polished aluminium shield (ϵ = 0.04) is placed between them. (16)

13. a) A horizontal cylinder of 0.4 m diameter at a surface temperature of 40°C is placed in air at 80°C. Compare the heat gain by the cylindrical surface with that of a vertical plate of height (Πx0.4)/2 m under the same conditions. (16)

(OR)

b) Calculate the rate of heat loss from a vertical cylinder 30 cm in diameter and 175 cm high while facing a 30 km/hr wind at 15°C. The surface temperature of the cylinder is 35°C. (16)

14. a) i) Explain the different regimes of pool boiling with diagram. (12)

ii) A plate type of condenser is of side L x 2L. It was designed to be kept with side of length 2L in the vertical position. But by oversight, the side of length L was kept vertical. If other conditions are the same, determine the change in heat transfer if any. Assume laminar condition in both cases. (4)

(OR)

b) i) In a food processing plant, a brine solution is heated from -12°C to -65°C in a double pipe parallel flow heat exchanger by water entering at 35°C and leaving at 20.5°C at the rate of 9 kg/min. Find the area of heat exchanger for an overall heat transfer coefficient of 860 W/m^2K. For water $c_p = 4.186 \times 10^3$ J/kgK. (12)

ii) A heat exchanger is required to cool oil from 60°C to 30°C using water at 20°C. The outlet temperature of water is 26°C. Suggest a suitable flow type for better rate of heat flow. (4)

15. a) A well is 40 m deep and 900 cm diameter and the atmospheric temperature is 25°C. The air at the top is having a relative humidity of 50%. Determine the rate of diffusion of water vapour through the well. Take D = 2.58×10^{-5} m^2/s. (16)

(OR)

b) i) State and explain the different modes of mass transfer. (8)

ii) Explain the analogy between heat transfer and mass transfer. (8)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

METALLURGICAL ENGINEERING

18MT401 – Mechanical Behaviour of Materials

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What are dislocation pile-up's?
2. List the differences between slip and twinning.
3. Show schematically the different types of solid solutions.
4. Define the term "strain hardening".
5. State the importance of finding out DBTT for material by impact testing.
6. Differentiate ductile and brittle fractures.
7. What is fatigue limit and how to find it?
8. Mention two service applications where low cycle fatigue failure is possible.
9. Name two creep resistant metallic materials.
10. List the difference between creep test and stress rupture test.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the formation of jog and kink during dislocation intersection with neat sketches. (16)

(OR)

b) i) Explain Frank Read source for dislocation multiplication. (8)

ii) Construct a Burger's circuit in a simple cubic structure with positive edge dislocation and label its Burger vector. (8)

12. a) With neat sketches, explain the mechanism of solid solution strengthening. (16)

(OR)

b) Discuss the precipitation hardening phenomena with an example, giving the conditions for precipitation hardening, steps in precipitation hardening, precipitation sequence during aging and the strengthening mechanism. (16)

13. a) What is fracture toughness and discuss briefly the K_{IC} Plain strain fracture toughness testing in details. (16)

(OR)

b) Explain Griffith's theory of brittle fracture. How is it modified by Orowan? (16)

14. a) i) Explain the factors affecting the fatigue properties of the materials. (8)

ii) Explain the fractographic features of fatigue failure with required diagrams. (8)

(OR)

b) Explain the testing procedure for fatigue testing as per the ASTM standard of materials with neat a sketch. (16)

15. a) Briefly discuss the various mechanisms responsible for creep deformation. Also explain the use of deformation mechanism map for creep studies. (16)

(OR)

b) Explain the metallurgical factor that affects the creep of materials. (16)

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

(2018 Regulations)

MECHANICAL ENGINEERING

18ME401 – Kinematics of Machinery

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What is the significance of Grashof's law?
2. Differentiate kinematic pair and kinematic chain.
3. What are the properties of instantaneous center?
4. What are the components of acceleration?
5. List the different motions of the follower?
6. Distinguish between in-line follower and offset follower.
7. State the law of gearing.
8. How epicyclic gear train differs from the other types of gear trains?
9. Define coefficient of friction.
10. Why self -locking screws have lesser efficiency?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Sketch and explain any three kinematic inversions of a single slider crank chain. (16)

(OR)

b) What is meant by inversion of a chain? Sketch and explain the various inversions of a four bar chain. (16)

12. a) A Toggle mechanism shown in the figure, 1 below the slider D is constrained to move on a horizontal path. The crank OA is rotating in a counterclockwise direction at a speed of 180 r.p.m increasing at the rate of 50 rad/s^2. The dimensions of the various linked are as follows OA = 180 mm, CB = 240 mm, AB = 360 mm and BD = 540 mm. For the given configuration find 1. Velocity of slider D and angular velocity of BD, and 2. Acceleration of slider D and angular acceleration of BD. (16)

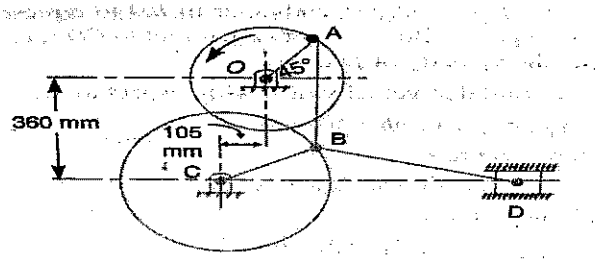

Figure.1.

(OR)

b) Locate all the instantaneous centers of the slider crank mechanism as shown in Figure,2. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, Find: 1. Velocity of the slider A, and 2. Angular velocity of the connecting rod AB. (16)

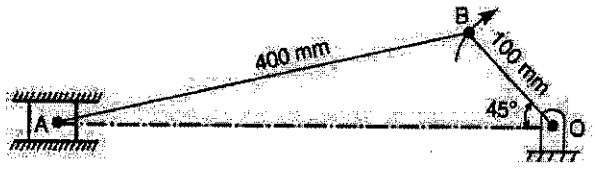

Figure.2.

13. a) Construct the profile of a cam to suit the following specification: camshaft diameter = 40 mm; least radius of cam = 25 mm; diameter of roller = 25 mm; angle of lift = 120°; angle of fall = 150°; lift of the follower = 40 mm; Number of pause are two of equal interval between motions. During the lift, the motion is SHM and During the fall the motion is uniform acceleration and deceleration. The speed of the cam shaft is uniform. The line of stroke of the follower is having an offset 12.5 mm from the center of the cam. (16)

(OR)

b) A cam drives a flat reciprocating follower in the following manner: During first 120° rotation of the cam, follower moves outwards through a distance of 20 mm with simple harmonic motion. The follower dwells during next 30° of cam rotation. During next 120° of cam rotation, the follower moves inwards with simple harmonic motion. The follower dwells for the next 90° of cam rotation. The minimum radius of the cam is 25 mm. Construct the profile of the cam. (16)

14. a) In an epicyclic gear train an annular wheel A having 54 teeth meshes with a planet wheel B which gears with a sun wheel C, the wheels A and C being coaxial. The wheel B is carried on a pin fixed on one end of arm P which rotates about the axis of the wheels A and C. If the wheel A makes 20 r.p.m. in a clockwise sense and the arm rotates at 100 r.p.m. in the anticlockwise direction and the wheel C has 24 teeth, determine the speed and sense of rotation of wheel C. (16)

(OR)

b) i) Draw the profile of a spur gear profile and explain the terminologies associated in it. (8)

ii) Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in an involute gear teeth when it meshes with wheel. (8)

15. a) The cutter of a broaching machine is pulled by square threaded screw of 55 mm external diameter and 10 mm pitch. The operating nut takes the axial load of 400 N on a flat surface of 60 mm internal diameter and 90 mm external diameter. If the coefficient of friction is 0.15 for all contact surfaces on the nut, determine the power required to rotate the operating nut, when the cutting speed is 6 m/min. (16)

(OR)

b) A multi-disc clutch has three discs on the driving shaft and two on the drive shaft. The outside diameter of the contact surfaces is 240 mm and inside diameter 120 mm. Assuming uniform wear and coefficient of friction as 0.3, find the maximum axial intensity of pressure between the discs for transmitting 25 kW at 1575 r.p.m. (16)

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IV Semester (Full Time)

(2018 Regulations)

ELECTRONICS AND COMMUNICATION ENGINEERING

18MA402 – Probability and Stochastic Process

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State the axioms of probability.
2. A random variable X has the following probability distribution.

X = x:	-2	-1	0	1	2	3
p(x);	0.1	k	0.2	2k	0.3	3k

Find k.

3. $X \sim B\left(10, \frac{1}{2}\right)$

Find the mean of the Binomial distribution.

4. If 'X' is uniformly distributed random variable with mean 1 and variance 4/3, find P (X<0).
5. State Chebyshev inequality
6. Define conditional density function.
7. State Central limit theorem.
8. Define mean square value of x(t).
9. Prove that $R_{XX}(\tau) = R_{XX}(-\tau)$
10. A stationary random process has an auto correlation function and is given by

$R_{XX}(\tau) = \frac{25\tau^2 + 36}{6.25\tau^2 + 4}$

Find the mean of the process.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) A random variable X has following probability function (16)

Value of X	0	1	2	3	4	5	6	7
P (x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

i) Find k

ii) Evaluate P (X < 6) and P (0 < X < 5)

iii) If P (X ≤ k) > 1, find the minimum value of k and determine the distribution function of X.

(OR)

b) i) In a bolt factory machines A, B, C manufacture respectively 25%, 35% and 40% of the total. Of their output 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C? (8)

ii) Find the m.g.f. of the random variable 'X' having p.d.f. (8)

$$f(x) = \begin{cases} x, & \text{for } 0 < x < 1 \\ 2 - x, & \text{for } 1 < x < 2 \\ 0, & \text{otherwise} \end{cases}$$

Find Mean and Variance.

12. a) i) Define Binomial distribution. Derive MGF, mean and variance. (8)

ii) Fit a poisson distribution to the following data: (8)

Deaths	0	1	2	3	4
Frequency	122	60	15	2	1

(OR)

b) i) Define Geometric distribution. Derive MGF, mean and variance. (8)

ii) The weekly wages of 1000 workmen are normally distributed around a mean of Rs. 70 with a S.D. of Rs. 5. Estimate the number of workers whose weekly wages will be i) between Rs. 69 and Rs. 72, ii) less than Rs. 69, iii) More than Rs. 72. (8)

13. a) From the following table for bivariate distribution of (X, Y) (16)

Find i) P (X≤1), ii) P (Y≤ 3), iii) P (X ≤1, Y≤3), iv) P (X ≤1/Y≤3), v) P (Y ≤3/X≤1), vi) P (X + Y ≤4)

X \ Y	1	2	3	4	5	6
0	0	0	1/32	2/32	2/32	3/32
1	1/16	1/16	1/8	1/8	1/8	1/8
2	1/32	1/32	1/64	1/64	0	2/64

(OR)

b) i) The joint p.d.f of the random variable (X,Y) is given by (8)

$f(x, y) = k\,xy\,e^{-(x^2+y^2)}$, $x > 0, y > 0$

i) Find k. ii) Prove X and Y are independent.

ii) The joint p.d.f of two random variables X and Y is given by (8)

$$f(x,y) = \frac{9(1+x+y)}{2(1+x)^4(1+y)^4} \qquad 0 \le x < \infty, \qquad 0 \le y < \infty$$

Find the marginal distributions of X and Y, the conditional distribution of Y for X = x and x for y=y.

14. a) i) Explain strong and weak law of large numbers. (8)

ii) If $X_1, X_2, \ldots\ldots X_n$ are Poisson variables with parameter $\lambda = 2$, use the central limit theorem to estimate $P(120<S_n<160)$, where $Sn=X_1+X_2+\ldots.+X_n$; and n=75. (8)

(OR)

b) Show that the process , $X(t) = A\cos\lambda t + B\sin\lambda t$ (where A and B are RVs) is WSS, if i) E(A) = E(B) =0, ii) E(A2) = E(B2) and iii) E(AB) = 0. (16)

15. a) Process {X(t)} whose probability distribution under certain conditions is given by, (16)

$$P\{X(t) = n\} = \begin{cases} \dfrac{(at)^{n-1}}{(1+at)^{n+1}}, n = 1,2,\ldots \\ = \dfrac{at}{1+at}, n = 0 \end{cases}$$

Show that it is not stationary.

(OR)

b) i) The cross-power spectrum of real random processes X(t) and Y(t) is given by (8)

$$S_{XX}(\omega) = \begin{cases} a + \dfrac{jb\omega}{w} & ,|\omega|<1 \\ 0 & ,elsewhere \end{cases}$$

Find the cross – correlation function.

ii) The auto correlation of the random binary transmission is given by (8)

$$R_{XX}(\tau) = \begin{cases} 1 - \dfrac{|\tau|}{T}, & for\ |\tau| \le T \\ 0, & for\ |\tau| > T \end{cases}$$

Find the power spectrum.

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B.E. Degree Examinations – April/May 2022

IV Semester (Full Time)

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COMPUTER SCIENCE AND ENGINEERING

18MA401 – Numerical Methods and Linear Programming Problem

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Form the divided difference table for the following data:

x:	-2	0	3	5
f(x):	-792	108	-72	48

2. What is the error in trapezoidal rule and order of the error?
3. Using Euler's method find $y(0.02)$ of $y(x)$ satisfies the initial value problem $y' = \frac{y-x}{y+x}, y(0) = 1.$
4. State Milne's Predictor and Corrector formula for solving the initial value problem.
5. Write down the one dimensional wave equation and its boundary condition.
6. Write down the standard 5 point formula to solve the Laplace equation.
7. What is mean by a feasible solution of a Linear programing problem?
8. What are the advantages of Linear programing problem?
9. Write down the necessary and sufficient conditions of a Transportation problem.
10. What do mean by a Basic cell in Transportation problem? How will you calculate the number of non-basic cells in TP.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Using Newton's Divided difference formula find the values of f(8) and f(5) from the following table: (16)

x:	4	5	7	10	11	13
f(x):	48	100	294	900	1210	2028

(OR)

b) Estimate $f(1.5)$, Using Newton's Forward Interpolation formula, from the given data: (16)

x :	0	1	2	3	4
f(x):	858.3	869.6	880.9	892.3	903.6

12. a) i) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule, by dividing the range into 6 equal parts. (8)

ii) Evaluate y(0.4) by Milne's Predictor and corrector method. Given $\frac{dy}{dx} = x + y$ and $y(0) = 1,\ y(0.1) = 1.1103,\ y(0.2) = 1.2381,\ y(0.3) = 1.3899.$ (8)

(OR)

b) i) Evaluate $\int_4^{5.2} log_e x dx$ by Trapezoidal rule. Also check up the results by actual integration. (8)

ii) Evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$, by using two point & three Gaussian quadrature formulas. (8)

13. a) i) Solve: $\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}; 0 < x < 1, t > 0,$
$u(x,0) = 100(x - x^2),\ u_t(x,0) = 0, u(0,t) = 0, u(1,t) = 0$ (8)

ii) Solve the equation $y'' + xy = 1$ with the conditions $y(0) = 0, y'(1) = 1$, by finite difference method, with $h = 0.5$. (8)

(OR)

b) Solve the equation $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square with sides $x = 0, y = 0, x = 3$ *and* $y = 3$ with $u = 0$ on the boundary and mesh length $= 1$. (16)

14. a) The Mount Everest company has been of picture tubes for television sets and certain printed circuits for radios. The company has just expanded into full scale production and marketing of AM and AM-FM radios. It has built a new plant that can operate 48 hours per week. Production of an AM radio in the new plant will require 2 hours and production of an AM-FM radio will require 3 hours. Each AM radio will contribute Rs 40 to profits while an AM-FM radio will contribute Rs 80 to profits. The marketing department, after extensive research has determined that a maximum of 15AM radios and 10 AM-FM radios can be sold each week. (16)

i) Formulate a linear programming model to determine the optimum production mix of AM and FM radios that will maximize profits.

ii) Solve this problem using the graphical method.

(OR)

b) Solve the LPP by using Simplex method: (16)

Maximize: $Z = 3x_1 + 2x_2 + 5x_3$

Subject to constrains:

$x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

$x_1 + 4x_2 \leq 420$

and $x_1, x_2, x_3 \geq 0$.

15. a) A dairy firm has three plants located in a state. The daily milk production at each plant is as follows: (16)

Plant 1: 6 million liters. Plant 2: 1 million liters, and

Plant 3: 10 million litres

Each day, the firm must fulfil the needs of its four distribution centres. The minimum requirement of each centre is as follows:

Distribution center 1: 7 million litres,

Distribution centre 2: 5 million litres,

Distribution centre 3:3 million litres, and

Distribution centre 4: 2 million litres

Cost (in hundreds of rupees) of shipping one million litre from each plant to each distribution centre is given in the following table:

		Distribution Centres			
Plants		D_1	D_2	D_3	D_4
	P_1	2	3	11	7
	P_2	1	0	6	1
	P_3	5	8	15	9

Find the initial basic feasible solution for given problem by using Least cost method.

(OR)

b) A travelling salesman has to visit five cities. He wishes to start from a particular city, visit each city once and then return to his starting point. The travelling cost (in Rs) of each city from a particular city is given below: (16)

		To City				
From City		A	B	C	D	E
	A	∞	1	5	7	1
	B	6	∞	3	8	2
	C	8	7	∞	4	7
	D	12	4	6	∞	5
	E	1	3	2	8	∞

What should be the sequence of visit of the salesman, so that the cost is minimum?

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ELECTRICAL AND ELECTRONICS ENGINEERING

18EE401 – Signals and Systems

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define signals with examples.
2. State the classification and characteristics of CT and DT systems.
3. h(t) = u(t). Find whether it is causal LTI system?
4. What is the condition for stable LTI system?
5. What are poles and zeros?
6. If the coefficient is b_n, what is the fourier series representation of f(t)?
7. List the advantages of Z transform.
8. State differentiation property in Z domain.
9. State sampling theorem.
10. What is aliasing?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Analyse on even and odd signals, power and energy signals with examples. (16)

(OR)

b) Discuss the properties: Additivity and Homgeneity, shift invariance and realizability of a system. (16)

12. a) i) If the step response of a system is given by $e^{-2t}u(t)$. Find the impulse response. (10)

ii) h(t) = sinc (t). Find whether it is stable LTI System? (6)

(OR)

b) i) $2d\frac{d^2y}{dt^2} + 2t\frac{dy(t)}{dt} = \frac{dx(t)}{dt} + 2x(t)$ Check whether it is a LTI system. (6)

ii) Obtain state variable model of the system which is decribed by the equation: $y''(t) + 3y'(t) + 2y(t) = r(t)$. (10)

13. a) i) Discuss the Fourier series representation of periodic signals. (8)

ii) Derive the equation for fourier series coefficient. (8)

(OR)

b) i) Give the relation between Fourier and laplace transform. (8)

ii) Report on Laplace domain analysis. (8)

14. a) i) Apply the relation between Z Transform and Inverse of Z Transform. (8)

ii) List the properties of Z Transform and explain on any three. (8)

(OR)

b) i) Find the Z transform of $x(n) = 2^n u(n)$. (8)

ii) Find the Z transform of $y(n) = -2^n u(-n-1)$. (8)

15. a) i) What is reconstruction? Explain on ideal interpolator. (8)

ii) Elaborate of zero order hold sampling. (8)

(OR)

b) i) Give a detailed introduction on the applications of system and signal theory. (8)

ii) Discuss on filtering. (8)

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CIVIL ENGINEERING

18CE401 – Strength of Materials

(Specify Any Chart or Tables etc. to be Permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Strain Energy.
2. State Castigliano's first and second theorem.
3. What is meant by Prop?
4. What are the advantages of indeterminate structures?
5. Write different effective lengths for different end conditions of a column.
6. Give the Euler's formula for both end fixed long column.
7. Define unsymmetrical bending.
8. What is Shear Centre?
9. State Lame's equation.
10. Calculate the bursting pressure for the cold drawn seamless steel tubing of 60 mm internal diameters with 2 mm wall thickness and ultimate strength of 380 MN/m^2.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) A cantilever 2 m long is of rectangular section120 mm wide and 240 mm deep. It carries a uniformly distributed load of 2.5 kN per metre length for a length of 1.25 metres from the fixed end and a point load of 1kN at the free end. Determine the deflection at the free end. Assume E = 10 GN/m2. by double integration method. (16)

(OR)

b) A Cantilever 3m long carries two point loads, 60kN each at distance of 0.75 m and 1.75m respectively from the fixed end. Determine deflection at free end. Assume E = 200 GN/m^2 and I = 12689400 cm^4 using Moment Area method. (16)

12. a) A fixed beam of 6m span carries point loads of 100kN and 75kN at 2 m and 4 m from the left support. Determine, (16)

i) Fixing moments at the ends

ii) Reactions at supports

Also draw the B.M.D and S.F.D.

(OR)

b) A continuous beam ABCD of uniform cross-section is loaded as shown in figure.1. (16)

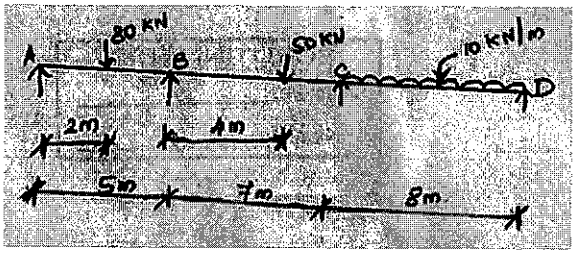

Figure.1.

Draw B.M.D and S.F.D.

13. a) Derive an expression for crippling load of long column with both ends hinged. (16)

(OR)

b) From the following data, determine thickness of cast iron column (16)

Length of column = 6 meters

External diameter = 200 mm

Load = 500kN

Factor of safety = 6

Assume ultimate compressive stress of 570 MN/m2 and Rankine's constant 1/1600 for both ends hinged.

14. a) A beam of T-section (Flanges :100 mm x 20 mm: Web: 150 mm x 10 mm) is 2.5 m in length and is simply supported at the ends. It carries a load of 3.2kN inclined at 20° to the vertical and passing through the centroid of the section. If E = 200 GN/m^2. Calculate (16)

i) Maximum tensile stress

ii) Maximum compressive stress.

(OR)

b) i) A channel section has flanges 12 cm x 2 cm and web 16 cm x 1 cm. Determine the Shear Centre of the channel. (8)

ii) Determine the position of the shear centre of the section of an I beam. Its flange width is 14 cm thickness is 4 cm web depth is 30cm and thickness is 2 cm. (8)

15. a) The external diameter of steel collar is 240 mm and internal diameter decreases by 0.15 mm when shrunk on to a solid steel shaft of 150 mm diameter. Determine: (16)

i) Radial pressure between the collar and the shaft

ii) Circumferential stress at the inner surface of the tube

iii) Reduction in diameter of the shaft

Assume E = 205GN/m² and poisson's ratio = 0.304.

(OR)

b) A mild steel shaft 120 mm diameter is subjected to a maximum Torque of 20kNm and a maximum bending moment of 12 kNm at a particular section. Determine the factor of safety according to Maximum Shear Stress Theory, if the elastic limit in simple tension is 220 MN/m². (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

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MECHANICAL ENGINEERING

18ME601 – Computer Integrated Manufacturing

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Computer Integrated Manufacturing.
2. Mention the role of marketing engineering in product development.
3. What is the significance of Group Technology in CAD/CAM integration?
4. List out the prerequisite for process planning.
5. What is cellular manufacturing?
6. How does a bar code reader work?
7. What is CIMOSA?
8. Draw Manufacturing Enterprise Wheel.
9. Compare MAP and TOP.
10. What is relational database?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Describe the nature and role of the elements of CIM system. (16)

(OR)

b) i) What is automation? Explain five levels of automation in detail. (8)

ii) Briefly explain any five islands of automation. (8)

12. a) i) Describe about OPTIZ coding system. (10)

ii) Generate form code for the following part using OPTIZ coding system. (6)

Figure.1.

(OR)

b) Illustrate the following with suitable example. (16)

i) Retrieval type CAPP

ii) Generative CAPP.

13. a) i) Enumerate Shop floor control system. (8)

ii) Explain any three automatic data collection systems used in Shop floor control. (8)

(OR)

b) Define FMS and explain in detail about elements of FMS. (16)

14. a) i) Enlist the challenges encountered while implementing CIM in an industry. (6)

ii) Briefly explain IDEF models for modelling a CIM system. (10)

(OR)

b) Mention the various topology used in LAN network and explain them with clear sketch. (16)

15. a) i) Describe the seven layers in Manufacturing Automation Protocol (MAP). (12)

ii) Explain the networks used in Technical Office Protocol (TOP). (4)

(OR)

b) i) Illustrate Relational data base model and Object models with an example. (10)

ii) Discuss about four classes of data in manufacturing. (6)

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VI Semester (Full Time)

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CIVIL ENGINEERING

18CE601 – Advanced Structural Analysis

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Write the slope deflection equations of a fixed beam AB where support B settles by Δ mm.
2. A continuous beam ABC, with all the edges hinged and equal spans of 3 m carries a central point load of 10 kN on AB and another point load of 20 kN at 2 m from C. Determine the fixed end moments.
3. Define distribution factor.
4. List the conditions under which sway will occur in a portal frame.
5. Define primary structure.
6. Write the element flexibility matrix [f] for a beam element.
7. Compare flexibility method and stiffness method.
8. List the properties of the stiffness matrix.
9. What is mean by finite elements?
10. Give examples of 2D elements.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) A two span continuous beam ABC is fixed at A and B while supported by a roller at B. Flexural rigidity of span BC is twice that of span AB. Span AB, 4 m long carries a central point load of 40 kN. Span BC, 6 m long carries a uniformly distributed load of 20 kN/m throughout its span. Analyse the beam using slope deflection method. (16)

(OR)

b) Analyse the frame shown in figure.1 using slope deflection method and draw bending moment diagram. (16)

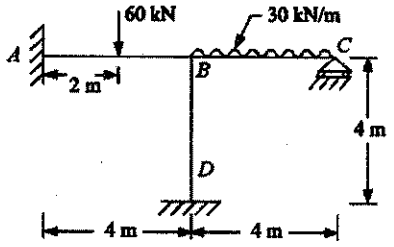

Figure.1.

12. a) Analyze the continuous beam shown in figure.2 using moment distribution method if the support B settles by 9 mm. Take EI = 1 x 10^{12} Nmm^2. (16)

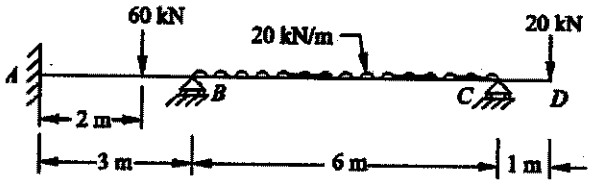

Figure.2.

(OR)

b) Analyze the portal frame shown in figure.3 using moment distribution method. (16)

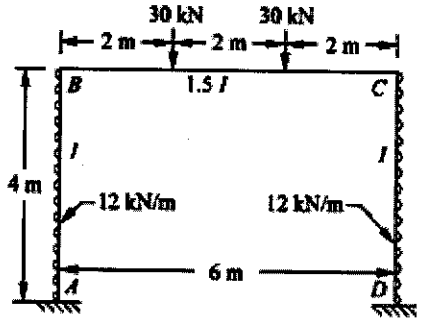

Figure.3.

13. a) Analyze the continuous beam ABC using matrix flexibility method. Span AB = 6 m and span BC = 4 m. Span AB carries a uniform load of 2 kN/m and span BC is loaded with a central point load of 10 kN. A and B are pinned while C is fixed. (16)

(OR)

b) Analyse the portal frame shown in figure.4 using flexibility matrix method. (16)

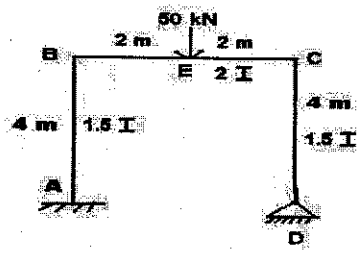

Figure.4.

14. a) A continuous beam ABC is fixed at C and pinned at A and B. Span AB =10 m, carries a point load of 240 kN at its centre. Span BC =10 m, carries a point load of 120 kN at its centre. Determine the end moments using stiffness matrix method. (16)

(OR)

b) A portal frame ABCD with fixed supports at A and D and at same level carries a UDL of 8 kN/m over BC. Span AB = BC = CD = 9 m. Take EI = constant. Analyse the frame using stiffness matrix method. (16)

15. a) i) What is mean by discretization of a structure? Explain its significance. (8)

ii) Write the step by step procedure for analyzing a simply supported beam using finite element method. (8)

(OR)

b) Calculate the displacement of the bar ABC using finite element method. Take E = 200 GPa. Figure.5. (16)

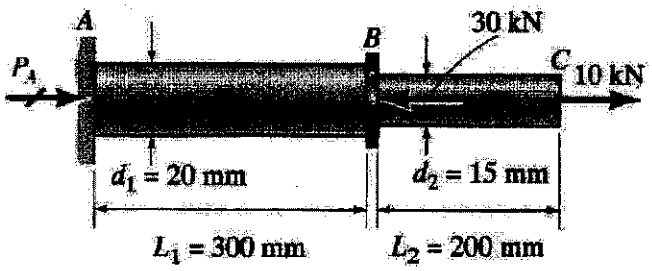

Figure.5.

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ELECTRONICS AND COMMUNICATION ENGINEERING

18EC601 – VLSI Design

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Design 4:1 multiplexer using transmission gates.
2. Compare MOSFET and BJT.
3. What are the types of oxidation process?
4. What is the etching process used in SOI process?
5. Calculate the critical path delay for a 4 bit ripple carry adder, if delay of each adder is 1.095μs.
6. Give the applications of counters.
7. How are blocking statements different from non-blocking statements?
8. What are the types of operators used in Verilog HDL?
9. What are the types of ASIC?
10. What is the need for testing?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)	i)	Explain the operation of nMOS enhancement transistor.	(10)
		ii)	Implement the following function using CMOS logic. F (A, B, C) = (A'BC + AB'C + ABC')'.	(6)
			(OR)	
	b)	i)	Derive the expression for DC Characteristics of CMOS Inverter	(10)
		ii)	Explain the second order effects of MOS transistor.	(6)
12.	a)	i)	Explain the n well process in the fabrication of CMOS inverter.	(12)
		ii)	What is a CMOS process enhancement?	(4)
			(OR)	
	b)	i)	How latch up is originated physically? What are the methods to prevent latch up?	(12)
		ii)	What are the advantages of Silicon on Insulator (SOI) over n-well process?	(4)

13. a) i) Design 16 bit carry skip adder. (8)

ii) Discuss on DRAM subarray. (8)

(OR)

b) i) Explain comparator with suitable example. (8)

ii) Explain the read and write operations of SRAM cell. (8)

14. a) i) Design 4 bit ripple carry adder using Verilog HDL. (8)

ii) Describe the switch level modelling and gate level modelling of digital circuits. (8)

(OR)

b) i) Design JK flip flop using Verilog HDL. (8)

ii) Discuss on the loop statements in Verilog. (8)

15. a) i) Describe the ASIC design flow and the steps involved in the design. (8)

ii) Explain Full custom ASIC design. (8)

(OR)

b) i) Explain Gate array based ASIC design. (8)

ii) Describe the programmable logic structures. (8)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

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COMPUTER SCIENCE AND ENGINEERING

18CS601 – Principles of Compiler Design

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is the need for grouping of phases in compiler?
2. Mention the role of lexical analyzer.
3. What are the two important rules used in shift reduce parser?
4. Define the kernel and non-kernel items.
5. Write the difference between S-attribute and L-attribute.
6. What is intermediate code? List the different forms of intermediate code.
7. What are the various forms of object code?
8. Write the difference between basic block and flow graph.
9. State the techniques used in loop optimization.
10. Mention the criteria for achieving machine independent optimization.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the various phases of a compiler. Also write down the output of each phase for the input r: = b^2-4ac. (16)

(OR)

b) Construct a DFA without constructing NFA for the following regular expression. Find the minimized state DFA a*b*a(a+b)*b*a. (16)

12. a) Construct the predictive parser for the following grammar (16)

E-> E or E

E-> E and E

E-> not E

E->(E)

E->0 | 1 Show the behavior of the parser for the sentence "not (0 or 1) and 0".

(OR)

b) Design an LALR parser for the following grammar and parse the input (16)

id = *id

S->L=R | R

L->*R | id

R->L.

13. a) Write the SDD for the following grammar and construct the annotated parse tree for the expression 5* (2*7+6*2) (16)

S->E

E->E+T | T

T->T*F | F

F-> (E) | id | digit.

(OR)

b) Write the translation scheme for the following statements (16)

S-> if E then S1 else S2

S-> while E do S1 and write the three-address code for

while (i<10) do

{ s = s+i;

I = i+1;

}

if (a<b) and (c>b) then x = x+y else x = x-y;

14. a) i) Explain the various issues in design of code generator. (8)

ii) Write the code generation algorithm. Explain with an example. (8)

(OR)

b) i) Illustrate the DAG representation of the basic block with suitable example. (8)

ii) Explain the peephole optimization. (8)

15. a) Explain the principal sources of optimization. (16)

(OR)

b) Illustrate Data flow analysis with suitable example. (16)

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B.E. Degree Examinations – April/May 2022

VI Semester (Full Time)

(2018 Regulations)

ELECTRICAL AND ELECTRONICS ENGINEERING

18EE601 – Power System Analysis and Stability

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Name the basic components of modern power system.
2. A generator rated at 50 MVA, 11 kV has a reactance of 20%. Calculate it's per unit reactance for a base of 100 MVA, 10 kV.
3. Determine Y_{11} element (p.u) of Y_{bus} matrix for the figure shown below. The values given in the figure.1 are impedances.

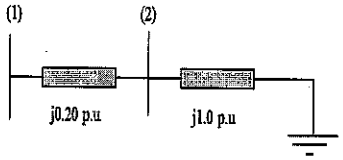

Figure.1.

4. Why is load flow study necessary?
5. Define 'Bolted fault'.
6. Find Z- bus for the following network figure.2.

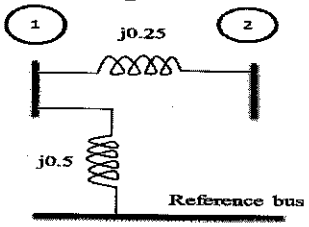

Figure.2.

7. The line currents in a three phase system are $I_a = 4 \angle 60°$, $I_b = 0$ and $I_c = 4 \angle -120°$. Determine the negative sequence current.
8. Classify different types of unsymmetrical faults.
9. State Equal area criterion.
10. Define load angle of a generator.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the modeling of generator, load and transmission line for power system analysis. (12)

ii) Interpret the expression for per unit calculation from one base value to another base value. (4)

(OR)

b) Interpret the reactance diagram for the Figure.3 given below using base of 100 MVA, 220 kV in 50 Ω line (16)

Generator: 50 MVA, 25 kV, X" = 20%

Synchronous motor: 50 MVA, 25 kV, X" = 30%

Star – Star transformer: 30 MVA, 25/220 kV, X= 15%

Star – Delta transformer: 30 MVA, 25/220 kV, X= 15%

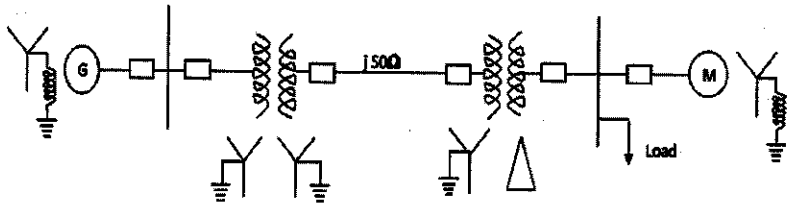

Figure.3.

12. a) i) With a neat flow chart, explain the algorithmic steps involved in computation of power flow solution using Gauss Seidel method. (12)

ii) Determine Y_{bus} matrix for the following bus data. (4)

Bus code	Admittance
1-2	2-j8
1-3	1-j4
2-3	0.666-j2.664
2-4	1-j4
3-4	2-j8

(OR)

b) With a neat flow chart, explain the algorithmic steps involved in computation of power flow solution using Fast Decoupled method. (16)

13. a) i) Explain briefly the selection circuit breakers under balanced fault condition. (4)

ii) Determine the bus impedance matrix for the network shown in figure.4. (12)

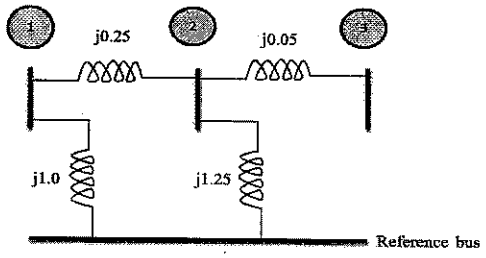

Figure.4.

(OR)

b) i) Explain the procedure for calculating the fault current and fault MVA of a typical power system network. (8)

ii) A 50 MVA, 11 kV alternator of 0.1 pu reactance is connected to a transformer 1 of 0.1 pu reactances, transmission line of 0.1 pu reactance and transformer 2 of 0.1 pu reactance. If a three phase symmetrical fault occurs after transformer 2, find the fault current. (8)

14. a) Develop an expression for fault current in Line to Ground fault on an unloaded generator in terms of symmetrical components. (16)

(OR)

b) i) The line current (in A) of a 3 phase supply to a unbalanced load are as below: (6)

$I_R = 12 + 24j$

$I_Y = 16 - 2j$

$I_B = -4 - 6j$

The phase sequence is RYB. Find the magnitude of zero sequence current (in A).

ii) Develop an expression for the positive sequence current Ia_1 of an unloaded generator when it is subject to a Double Line to Ground fault. (10)

15. a) i) Derive the swing equation of a synchronous machine swinging against an infinite bus. (10)

ii) A 50 Hz, 8 pole turbo alternator rated at 100 MVA, 13.2 kV has an inertia constant of 9 MJ / MVA. Find i) energy stored in the rotor at synchronous speed ii) rotor acceleration if the mechanical input is suddenly raised to 90 MW for an electrical load of 60 MW. (6)

(OR)

b) i) Explain the computational procedure for solving swing equation using Runge - Kutta method with flow chart. (12)

ii) What are the methods of improving transient stability? (4)

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VI Semester (Full Time)

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METALLURGICAL ENGINEERING

18MT601 – Nonferrous Extractive Metallurgy

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Which metallic elements can be extracted from ocean water?
2. What is meant by metallothermic reduction?
3. List the advantages of hydrometallurgy over pyrometallurgy.
4. Give the applications of bio-leaching in non ferrous extraction.
5. What is fused salt electrolysis?
6. Give the principle of distillation process of refining.
7. List the ores and applications of copper.
8. What is smelting?
9. State the principle of Park's process of silver extraction.
10. Name the ores of uranium and zirconium (each two).

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain any four methods of roasting in detail with the reactions involved in them. (16)

(OR)

b) Explain the carbothermic reduction of certain oxide ores with the help of Ellingham's diagram. (16)

12. a) Explain any three methods of leaching of lean grade ores with the reactions involved in the process. (16)

(OR)

b) With neat block diagram, explain the recovery of metallic values from the leach liquor by solvent extraction process. (16)

13. a) Explain the Hall – Heroult electrolytic process of aluminium extraction from the fused bath containing alumina. (16)

(OR)

b) With neat sketches explain fire refining and zone refining processes in detail. (16)

14. a) With a flow sheet, explain the Mond's process of nickel extraction. (16)

(OR)

b) Explain the Bayer's process of producing Alumina from Bauxite ore. (16)

15. a) With a flow sheet, explain the Kroll's process of titanium extraction from illmenite ore. (16)

(OR)

b) Explain the different methods of extraction of gold. (16)

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VIII Semester (Full Time)

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CIVIL ENGINEERING

18CEPE23 – Prestressed Concrete Structures

(IS 1343 and Tables shall be permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Differentiate Pre tensioning from Post tensioning system.
2. What is load balancing method?
3. List out the types of losses.
4. What are the factors influencing deflection of prestressed beam?
5. Write the limit state of serviceability for cracking as per IS 1343.
6. Write the minimum grade of concrete for pre tensioning and post tensioning system.
7. Distinguish anchorage zone and end block zone.
8. What is bursting tension?
9. What is externally unbonded post tensioned system?
10. Define: Partial Prestressing.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Enumerate the methods of prestressed concrete with neat sketches. (16)

(OR)

b) A rectangular concrete beam of cross section 600 mm deep and 300 mm wide is prestressed by ten number of 5 mm diameter wires located 100 mm from the bottom of the beam and three 5 mm wires, 25 mm from the top. Assuming the effective stress in the steel as 900 N/mm^2. a) calculate the stresses at the extreme fibers of the mid span section when the beam is carrying its own weight over a span of 6m, and b) if a UDL of 6 kN/m is imposed and the modulus of rupture of concrete is 6.5 N/mm^2, obtain the maximum working stress in concrete and estimate the load factor against cracking. The density of concrete is 24 kN/mm^2. (16)

12. a) A pretensioned beam of rectangular cross section, 150 mm wide and 300 mm deep is prestressed by eight numbers of 7 mm wires located 100 mm from the soffit of the beam. If the wires are initially tensioned to a stress of 1100 N/mm^2, calculate their stress at transfer and the effective stress after all losses given the following data. (16)

E_s = 210 kN/mm^2, E_c = 31.5 kN/mm^2

	Up to time of transfer	Total
Relaxation of steel	35 N/mm^2	70 N/mm^2
Shrinkage of concrete	100 x 10^{-6}	300 x 10^{-6}
Creep coefficient	----	1.6

(OR)

b) A simply supported concrete beam of span 8m and rectangular cross section 125 mm wide and 250 mm deep, is prestressed by a single cable in which the total tensile force is 220 kN. The center line of the cable is parallel to the axis of the beam and 75 mm above the soffit over the middle – third of the span and is curved upward in a parabola over the outer –thirds of the span to a distance of 175 mm above the soffit at the supports. If E_c = 35 kN/mm^2 and density of concrete is 24 kN/mm^2. Calculate: (16)

i) The upward deflection at mid-span due to prestress only,

ii) The deflection when the beam is supporting its own weight and the magnitude of concentrated loads Q placed at third points of the span, which would result in a limiting short-term deflection of span/500.

13. a) An unsymmetrical I section bridge girder has following section properties width and thickness of top flange = 1200 mm and 360 mm respectively, thickness of web 240 mm, centroid of section located at 580 mm from the top, the girder is used over a span of 40 m and the bonded tendons with a cross section of 7000 mm^2 are parabolic with an eccentricity of 1220 mm at the center of span and zero at the supports. Given f_{cu}= 45 N/mm^2 and f_{pu}= 1700 N/mm^2, estimate the ultimate flexural strength of center of span section using IS1343 codal provisions. (16)

(OR)

b) A prestressed concrete T beam is to be designed to support an imposed load of 4.4 kN/m over an effective span of 5 m. The T beam is made up of a flange 400 mm wide and 40 mm thick. The rib is 100 mm wide and 200 mm deep. The stress in concrete must not exceed 15 MPa in compression and zero in tension at any stage. Check for the adequacy of the section provided and calculate the minimum prestressing force necessary and the corresponding eccentricity. Assume 20% loss of prestress. (16)

14. a) The end block of post tensioned bridge girder is 400 mm wide by 1000 mm deep. Two cables, each comprising 90 high tensile wires of 7 mm diameter, are anchored using square anchor plates of side length 410 mm with their centre located at 600 mm from the top and bottom edges of the beam. The jacking force in each cable is 4500 kN. Design a suitable anchorage zone reinforcement using Fe-415 grade HYSD bars conforming to IS:1343 code provisions. (16)

(OR)

b) Explain Guyon's method of computing bursting tension in the case of end blocks subjected to force is evenly distributed with the multiple anchorages. (16)

15. a) Design a non-cylinder prestressed concrete pipe of 600 mm internal diameter to withstand a working hydrostatic pressure of 1.05 N/mm^2, using a 2.5 mm high tensile wire stressed to 1000 N/mm^2 at transfer. Permissible maximum and minimum stresses in concrete at transfer and service loads are 14 N/mm^2 and 0.7 N/mm^2. The loss ratio is 0.8. Also calculate the test pressure required to produce a tensile stress of 0.7 N/mm^2 in concrete when applied immediately after tensioning and the winding stress in steel if E_S = 210 kN/mm^2, E_C = 35 kN/mm^2. (16)

(OR)

b) What is composite construction? Explain the analysis of stress for composite section and the types of composite construction with neat sketches. (16)

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VIII Semester (Full Time)

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ELECTRONICS AND COMMUNICATION ENGINEERING

18ECPE810 – Satellite Communication

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Differentiate apogee and perigee with the help of a diagram.
2. A satellite is orbiting in the equatorial plane with a period from perigee to perigee of 10 h. Given that the eccentricity is 0.002. Calculate the semi major axis. The earth's equatorial radius is 6378.1414 km.
3. What is the purpose of Hohmann transfer orbit?
4. When does earth eclipse of satellite occurs and what is the duration of it?
5. List the features of MATV.
6. A satellite has the down link frequency is 10 GHz and it operates with a transmit power of 5 w and an antenna gain of 48.2 dB. Estimate the EIRP in dBW.
7. What are the two basic problems in satellite digital transmission?
8. Differentiate single access and multiple accesses.
9. Write short notes on DBS's orbital spacing.
10. Define VSAT .List the user groups of VSAT and its applications.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain how Kepler's and Newton's laws are used to define the orbit in satellite communication. (16)

(OR)

b) Give a detailed note on launching vehicles and give the step by step procedures employed for launching spacecraft in GEO orbits. (16)

12. a) How the attitude and orbit control system (AOCS) is achieved through spin stabilization systems? Discuss with necessary diagrams. (16)

(OR)

b) Briefly discuss about: (16)

i) TT & C subsystem

ii) Antenna Subsystem.

13. a) Mention the various transmission losses and explain. How these losses are incorporated in the link power budget equation? (16)

(OR)

b) With the indoor and outdoor block diagram, explain receive only home TV system. How CATV system differs from receive only home TV system? (16)

14. a) Brief about pre assigned and demand assigned FDMA with its advantages and disadvantages. (16)

(OR)

b) Explain how the SPADE system is operating to overcome the drawbacks present in pre assigned and demand assign FDMA. (16)

15. a) Discuss on the following: (16)

i) DBS television

ii) GPS

iii) HDTV

iv) Bit rates for digital television.

(OR)

b) List the specialized services provided by the satellite and explain any two in detail. (16)

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B.E. Degree Examinations – April/May 2022

VI & VIII Semester (Full Time)

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ELECTRICAL AND ELECTRONICS ENGINEERING

18EEP24 – Smart Grid

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define smart electric grid.
2. Mention the utility benefits due to the transformation of smart grid.
3. What is HAN?
4. List out the standard used for smart metering.
5. Write the benefits of smart meter.
6. How the relay IEDs can support for substation automation?
7. What is the role of PMUs in WAMPAC?
8. List out the essential CIS applications.
9. Identify any four energy storage devices can be support for smart power system operations.
10. Write the different types of Fuel cell.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Detail the key aspects of smart grid development. (8)

    ii) Elaborate the potential opportunities and challenges in transforming smart electric grid. (8)

(OR)

    b) i) Detail the advancements required in smart grid against traditional electric grid. (8)

    ii) Explain the functions of various smart grid components. (8)

12. a) Sketch the communication infrastructure for the smart grid. Explain the application of wireless LAN in smart grid. (16)

(OR)

    b) Explain the application ZigBee communication network and power line communication for the smart grid. (16)

13. a) Draw the architecture of smart meter and explain the key components in it. (16)

(OR)

b) i) Define demand side integration and elaborate the various DSI services. (8)

ii) Explain the configuration for substation automation. (8)

14. a) i) Explain the structure of typical EMS configuration. (8)

ii) Elaborate the main components in distribution management system. (8)

(OR)

b) i) Explain the configuration of WAMPAC. (8)

ii) Detail the key attributes of SCADA. (8)

15. a) Elaborate the need for the energy storage devices in smart grid network operations. (16)

(OR)

b) Detail the principle of operation and applications of following energy storage devices. (16)

i) Super capacitors, and

ii) SMES.

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VI & VIII Semester (Full Time)

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MECHANICAL ENGINEERING

18MEPE61 – Cryogenic Engineering

(Use of Steam table, refrigeration table and psychrometric chart is permitted)

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. State the significance of Joule Thomson inversion curve.
2. Define adiabatic expansion.
3. What are the factors to be considered during liquefaction process?
4. List the critical components of a liquefaction system.
5. Define tonne of refrigeration.
6. Compare cryogenic refrigeration with ideal refrigeration system.
7. Define super insulation.
8. What are the factors to be considered while designing a storage vessel for cryogenic fluids?
9. Classify the temperature measurement systems used in cryogenic engineering.
10. Define cryo pumping.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain the working principle of a Linde Hampson system with a suitable sketch. (16)

(OR)

b) Explain the working principle of Claude system with an appropriate diagram. (16)

12. a) Explain the method of hydrogen liquefaction system with a suitable sketch. (16)

(OR)

b) Explain the neon liquefaction system with a suitable sketch. (16)

13. a) Explain the classification of refrigerants in detail. (16)

(OR)

b) Explain the working principle of vapour compression refrigeration system with a suitable sketch. (16)

14. a) What is the need of insulation in a refrigeration system? Explain vacuum insulation with a suitable sketch. (16)

(OR)

b) Explain cryogenic fluid storage systems in detail. (16)

15. a) Classify the heat exchangers used for cryogenic systems and explain any one with suitable sketch. (16)

(OR)

b) Explain with suitable diagram about flow level and pressure measurement systems used in cryogenic systems. (16)

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MECHANICAL ENGINEERING

18MEPE63 – Robotics

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by pitch, yaw and roll?
2. Classify the robot anatomy.
3. List some examples of Robot End Effector.
4. Illustrate any four important factors to be considered in the selection and design of grippers.
5. Outline segmentation.
6. Apply the principle of inductive type proximity sensor.
7. Define the degrees of freedom.
8. Compare forward and backward kinematics.
9. Determine payback period for universal robot.
10. Discuss palletizing and depalletizing.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Define the four types of basic robot configurations. (12)

ii) List out the advantages and disadvantages of four basic robot configurations. (4)

(OR)

b) i) List out the robot parts and their functions. (12)

ii) Define Joint Notation Scheme. (4)

12. a) i) Explain the design and selection of robot gripper. (10)

ii) Explain and discuss about Magnetic Grippers. (6)

(OR)

b) i) Explain about the various types of Gripper mechanisms. (10)

ii) Explain with neat sketch of Pneumatic actuators system. (6)

13. a) i) Develop the Machine vision systems for pick and place robot. (12)

ii) Built the following sensor: (4)

i) Optical encoders

ii) Ultrasonic proximity sensors.

(OR)

b) i) Identify the various techniques in image processing and analysis. (12)

ii) Discuss about Touch Sensor and its application. (4)

14. a) i) Distinguish between the forward and reverse transformation for two-degree of freedom and three-degree of freedom arm. (8)

ii) What is the working principle of teach pendant? (8)

(OR)

b) i) Distinguish the Robot Programming Languages in detail. (8)

ii) List out the commands used in VAL programming and discuss in detail. (8)

15. a) i) Analyze the types of Robot cell design based on application area. (8)

ii) Discuss Safety sensors and safety monitoring of Robots. (4)

iii) Select the various types of robots used for material handling systems. (4)

(OR)

b) i) Distinguish any two methods for economic analysis of industrial robots. (8)

ii) Briefly explain the various steps involved for implementing the robot in industries. (4)

iii) Discuss in detail about the applications of robot in automobile industries. (4)

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VI & VIII Semester (Full Time)

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MECHANICAL ENGINEERING

18MEPE65 – Design of Production Tooling

(Use of design data book is permitted)

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Mention any four importance of cutting tool.
2. Distinguish between reamer and broach.
3. Write the significance of the tool holder.
4. Why did you study the economics of machining?
5. Give the importance of design of gauges.
6. Name any four design parameters used in machining process.
7. Classify type of jigs.
8. List any four advantages of box Jigs.
9. Compare progressive and compound die.
10. What is meant by blank holding pressure?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Briefly design a single point cutting tool for making turning operation with your own design parameters. (16)

(OR)

b) Draw the typical broach tool. How to determine maximum and minimum hole size, maximum broaching allowance, rise per teeth, number of semi finish teeth and rough teeth? (16)

12. a) Explain the concept of metal cutting theories. How it is useful to design phase? (16)

(OR)

b) Discuss the selection of tools in machining application for optimizing the parameters with a case study. (16)

13. a) Discuss the concept and principle of location and clamping process with a case study. (16)

(OR)

b) How to inspect the fixtures? And describe its degree with an example. (16)

14. a) Sketch any one of the drill bush and explain its significance, uses and advantages with a neat diagram. (16)

(OR)

b) Draw any one of the drill jigs, determine the various parameter for jig with help of own design. (16)

15. a) How to design upper and lower shoe and shank for any one of press tool? Write its steps and calculation procedures. (16)

(OR)

b) Sketch the drawing die and bending die. How the design is useful for simple components with the help of own design procedure calculation? (16)

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VI & VIII Semester (Full Time)

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METALLURGICAL ENGINEERING

18MT801 – Total Quality Management

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Define the term TQM.
2. What is quality planning?
3. Mention the need of quality audits.
4. Recall the term Calibration.
5. List the characteristics of TQM.
6. What is QFD?
7. Mention the various SQC techniques.
8. What is the purpose of a control chart?
9. What is the role quality circle in TQM?
10. What do you mean by employee involvement?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11.	a)		Explain Seven Quality Management principles.	(16)
			(OR)	
	b)	i)	Discuss the Five steps in the Strategic planning process.	(8)
		ii)	Give a detailed account on 8 steps in the bench marking process.	(8)
12.	a)		Explain the process quality audit and system quality audit with examples.	(16)
			(OR)	
	b)	i)	Give a detailed account on four costs of quality.	(8)
		ii)	Describe the principles of quality improvement.	(8)
13.	a)		Explain the 14 principles of Deming in TQM.	(16)
			(OR)	
	b)		Describe the new seven management tools.	(16)

14. a) i) Illustrate the two main types of control charts. (8)

ii) Describe the methods of Statistical process control. (8)

(OR)

b) i) Explain the process capability analysis with examples. (8)

ii) Explain the EWMA control charts. (8)

15. a) i) Describe the objectives and benefits of Quality Circles. (8)

ii) Explain the key characteristics, purpose and disadvantages of Self managed teams. (8)

(OR)

b) Explain the three types of employee involvement with some examples. (16)

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VIII Semester (Full Time)

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CIVIL ENGINEERING

18CEPE10 – Air Pollution Monitoring and Control

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List any four Air Pollutants.
2. Differentiate between Source Sampling and Ambient Sampling.
3. What is meant by Lapse rate?
4. Define plume rise.
5. State the principle of Air Pollution Control.
6. Distinguish Adsorption and Absorption.
7. How Air Quality Standards can be improved?
8. Quote the importance of the Emission Inventory.
9. What is meant by Noise?
10. Write a note on Acoustic Zoning.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Give a detailed note on Particulate and Gaseous pollutants. (8)

ii) Explain briefly the sources of Air Pollution. (8)

(OR)

b) i) Discuss about the effects of Air Pollution on human beings, vegetation and animals. (12)

ii) Write a note on Global Warming and Ozone Layer depletion. (4)

12. a) i) Explain briefly various the elements of Atmosphere. (8)

ii) Brief the following Meteorological Factors. (8)

i) Wind speed and Direction

ii) Temperature

iii) Humidity.

(OR)

b) i) Describe about the dispersion of Air Pollutants. (10)

ii) Discuss in detail about Dispersion Models. (6)

13. a) i) Elaborate about the Particulates control by Gravitation, Filtration and Electrostatic precipitation. (12)

ii) Write short note on Scrubbing. (4)

(OR)

b) i) Give a detailed account on Condensation and Combustion. (6)

ii) Discuss briefly about the control of Pollution for Major Industries Such As Paper Mill, Steel Industry and Cement factory. (10)

14. a) i) Explain how the Air Quality can be monitored. (12)

ii) List the preventive measures in Air Quality Management. (4)

(OR)

b) i) Brief about the Town Planning Regulations for upcoming new Industries. (4)

ii) Discuss about the various Legislations available for the Air Quality Management. (12)

15. a) i) List and explain about the sources of Noise Pollution. (12)

ii) How is the Noise Pollution assessed? Discuss. (4)

(OR)

b) i) Elaborate about the following effects of Noise Pollution. (8)

i) Auditory effect

ii) Non Auditory effect.

ii) Give a detailed note on steps to control Noise Pollution. (8)

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MECHANICAL ENGINEERING

18CEOE02 – Disaster Mitigation and Management

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. What is meant by resilience?
2. Quote any four examples for pandemics.
3. Why mitigation and preparedness are necessary?
4. Recall the importance of early warning system.
5. Mention the factors affecting vulnerabilities.
6. Give the significance of climate change adaptation.
7. Write the role of sanitation in disaster risk management.
8. Reproduce the role of GIS (Geographic Information System) in risk assessment.
9. List the causes of landslide in hills.
10. Brief a note on man-made disasters.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Elaborate about causes and impacts of flood and drought pertaining to economic, political health and psychosocial factors. (8)

ii) Explain about causes and impacts of earthquake, fire and landslide pertaining to economic, political health and psychosocial factors. (8)

(OR)

b) i) Discuss about the global trends in disasters. (8)

ii) Brief the Do's and Don'ts during various types of disasters. (8)

12. a) i) Describe about the structural and non-structural measures. (8)

ii) Outline the roles and responsibilities of community and Panchayati Raj. (8)

(OR)

b) i) Elaborate about the institutional processes and framework at central level. (8)

ii) Discuss about the State Disaster Management Authority (SDMA). (8)

13. a) i) Explain about the impacts of disasters on development projects such as dams and embankments. (8)

ii) Elaborate about the role of the Intergovernmental Panel on Climate Change (IPCC) by United Nations. (8)

(OR)

b) i) Describe about the role of the Indian government pertaining to climate change. (8)

ii) Brief about the relevance of indigenous knowledge, technology and local resources available for development after / prior to a disaster in India. (8)

14. a) i) Discuss about the various components of disaster relief. (8)

ii) Give an account on the hazard and vulnerability profile of India. (8)

(OR)

b) i) Explain about the role of Information Technology in preparedness, response and recovery phases during and after disaster. (8)

ii) Describe the process of assessment of disaster and their damages. (8)

15. a) i) With a case study, outline the disaster management of landslide. (8)

ii) Give the detailed procedure of assessment of buildings during earthquake. (8)

(OR)

b) i) Write short notes on the following. (8)

i) Fluvial flooding (River Floods)

ii) Pluvial flooding (Surface water floods).

ii) Discuss about the role of space (Remote Sensing / Satellite Information) based inputs for disaster mitigation and management. Mention the advantages of the space based inputs. (8)

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ELECTRONICS AND COMMUNICATION ENGINEERING

18ECPE806 – Wireless Sensor Networks

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Why EEPROM is preferred for wireless sensor network?
2. What is the need for gateway node in WSN?
3. Define wakeup period.
4. Define duty cycle of sensor node.
5. What is multilateration in localization?
6. Write any four requirements of time synchronization.
7. Define hop stretch factor.
8. How message overhead and latency determines the efficiency of data aggregation?
9. Define asynchronous code in nesC.
10. Why Tiny OS implementations have no file system?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Describe the technological challenges involved in designing the wireless sensor network. (8)

    ii) Briefly elucidate the similarities and difference between Ad-hoc network and wireless sensor network. (8)

(OR)

    b) i) Draw the sensor node hardware component and briefly describe the transceiver structure, operational states and wakeup radio concept. (8)

    ii) Construct a wireless sensor network with gateway node and explain the principle of operation behind the remote sensor nodes communication with remote cloud server. (8)

12. a) i) Explain the S-MAC principle of operation during periodic wakeup, idle listening and sleep period. (8)

    ii) Give a brief account on fundamentals of name and address management approaches in sensor networks. (8)

(OR)

b) i) Explain the mechanism involved in designing a mediation device protocol for low-rate WPAN standard. (8)

ii) Design a distributed assignment of local unique address using Address assignment algorithm. (8)

13. a) i) Design Light weight time synchronization (LTS) protocol based on sender/receiver synchronization. (8)

ii) Discuss the trilateration, triangulation and scene analysis approaches for localization and positioning of sensor nodes. (8)

(OR)

b) i) Elucidate the mechanism involved in Positioning the sensor nodes in multihop environments. (8)

ii) With suitable schematic diagram explicate the cricket single-hop localization technique. (8)

14. a) i) Construct the neighbor node for a random topology of 10 sensor devices based on cone-based topology control and spanning tree approach. (8)

ii) Construct the neighbor node for a tree topology of 10 sensor devices in based on naive dominating set centralized algorithm. (8)

(OR)

b) i) Discuss the working principle of Low-Energy Adaptive Clustering Hierarchy (LEACH) protocol in determining cluster heads and data transmission between different cluster heads. (8)

ii) Construct three cluster group, each group consist of 10 nodes; describe the working mechanism behind choosing of cluster heads based on the weighted clustering algorithm with suitable schematic diagrams. (8)

15. a) i) Draw the MICA mote architecture and discuss its operation in detail. (8)

ii) Describe the functioning of Tiny OS under a resource constrained hardware platforms for field monitor application. (8)

(OR)

b) i) Write a pseudocode for Sense And Send component to broadcast sensor readings to nearby nodes. (8)

ii) Discuss few collaboration group management protocols customized for state centric programming. (8)

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COMPUTER SCIENCE AND ENGINEERING

18CSPE807 – Cloud Computing

Time : 3 Hours | Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List out any four influential factors for the development of parallel processing.
2. How do the problems with scalability and fault tolerance should be rectified in cloud computing?
3. Mention the characteristics of virtualized environments.
4. How do you avoid nested translation in order to reduce performance impact in Type-II hypervisors?
5. What are SLOs for web applications? How the traditional approaches helpful to perform SLOs for those applications?
6. Why the importance given in cloud computing to data intensive computing rather than CPU intensive computing?
7. How much the amazon web service should be helpful for users?
8. List out the services provided by Aneka Cloud Application Platform.
9. What is the purpose of identity concept in cloud computing?
10. Mention few cloud scientific applications.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Discuss briefly about principles of parallel computing. (12)

    ii) Which is the most important benefit of cloud computing? (4)

(OR)

    b) i) Explain briefly about cloud reference model. (12)

    ii) How the characteristics of cloud computing support efficient resource allocation? (4)

12. a) Discuss briefly about various levels of virtualization. (16)

(OR)

    b) i) Explain about VMware full virtualization. (12)

    ii) What are the merits of virtualization? (4)

13. a) Explain Map Reduce Programming model with suitable word count example. (16)

(OR)

b) i) Discuss about SLA management in cloud. (8)

ii) Life cycle of SLA. (4)

iii) Is SLA useful for metering purpose? Justify your answer. (4)

14. a) Discuss about the cloud platform as service for developing and hosting web applications in Google-managed data centers. (16)

(OR)

b) Explain about cloud computing platform for managing heterogeneous distributed data center infrastructures. (16)

15. a) i) Discuss about cloud computing and data security risk. (8)

ii) What is the current state of data security in cloud? (4)

iii) What is the working concept behind digital identity? (4)

(OR)

b) Is the content level security useful for smartphones? Justify your answer. (16)

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MECHANICAL ENGINEERING

18MAOE03 – Sampling Theory and Numerical Methods

(Statistical Table is permitted)

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define Null Hypothesis.
2. What is Type I error and Type II error?
3. Compare Guass-Jacobi and Guass-Seidel methods.
4. What is the sufficient condition for the convergence of a root of $f(x) = 0$ by N–R method?
5. Form the divided difference table for the following data:

X:	5	15	22
Y:	7	36	160

6. When does Simpson's rule give exact result?
7. Given $y' + y = 0$ and $y(0) = 1$. Find $y(0.01)$, by Euler method.
8. State Algorithm for modified Euler method.
9. Why Crank Nicholson scheme is called an implicit scheme?
10. Write the diagonal five-point formula to solve the Laplace equation.

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) A random sample of 10 boys had the following I.Q.'s : 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean I.Q of 100? Find a reasonable range in which most of the mean I.Q. values of samples of 10 boys lie. (8)

ii) In two large populations, there are 30 and 25 per cent respectively of blue – eyed people. Is this difference likely to be hidden in samples of 1,200 and 900 respectively from the two populations? (8)

(OR)

b) i) The theory predicts the proportion of beans, in the four groups A, B, C and D should be 9: 3: 3 :1. In an experiment with 1600 beans the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory? (8)

ii) Two independent samples of 8 and 7 items respectively had the following values of the variable (weight in kgs.) (8)

Sample I:	9	11	13	11	15	9	12	14
Sample II:	10	12	10	14	9	8	10	

Use 0.05 level of significance to test whether it is reasonable to assume that the variances of the two population sample are equal.

12. a) i) Solve: 28x+4y-z=32, x+3y+10z= 24, 2x+17y+4z=35 by Guass-Seidel method. (8)

ii) Using Gauss-Jordan method, find the inverse of (8)

$$A=\begin{pmatrix}3 & 1 & 2\\ 2 & -3 & -1\\ 1 & 2 & 1\end{pmatrix}$$

(OR)

b) Fit a second degree parabola to the following data. (16)

X:	1929	1930	1931	1932	1933	1934	1935
Y:	352	356	357	358	360	361	361

13. a) i) Fit a Lagrangian polynomial to the following data and find x when y = 20 (8)

x: 1 2 3 4

y: 1 8 27 64

ii) From the following data find θ at x=43 (8)

x	40	50	60	70	80	90
θ	184	204	226	250	276	304

(OR)

b) i) Evaluate by Trapezoidal rule with h = 0.2. Also find π (8)

$$\int_0^6 \frac{dx}{1+x^2}$$

ii) Find the value of log $2^{1/3}$ from $\int_0^1 \frac{x^2}{1+x^3}dx$ using Simpson's 1/3 rule with h =0.25. (8)

14. a) i) Using Taylor Series method find y at given x. (8)

$\frac{dy}{dx}=3x+\frac{y}{2}, y(0)=1$; h = 0.1 and x = 0.1.

ii) Using Runge-Kutta method of fourth order find y(0.2) from (8)

$y'=y-x,\ y(0)=2$ taking h=0.1.

(OR)

b) i) Using Milne's predictor-corrector method find y(4.4) given that (8)

$5xy'+y^2-2=0$, y(4)=1, y(4.1)=1.0049, y(4.2)=1.0097, y(4.3)=1.0143.

ii) Using Adam's method find y(0.4) given (8)

$y'=xy/2,\ y(0)=1$, y(0.1)= 1.01, y(0.2)=1.022, y(0.3)=1.023.

15. a) Solve the Poisson's equations (16)

$\nabla^2 u = -10(x^2 + y^2 + 10)$, over the square mesh with sides x=0, y=0, x=3, y=3 with u=0 and mesh length 1 unit.

(OR)

b) Solve using the Crank-Nicholson method (16)

$16u_t = u_{xx}, 0 < x < 1, t > 0$, u (x,0) = 0, u (0,t) = 0 , u (1,t) = 100 t , for one time step by taking h=1/4.

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ELECTRONICS AND COMMUNICATION ENGINEERING

18ECPE802 – Multimedia Compression Techniques

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. Define the term 'redundancy' in information theory.
2. Give some models that are used in lossless compression.
3. What are the different approaches used in adaptive dictionary technique?
4. What are the applications of Arithmetic coding?
5. List the various analysis / synthesis speech schemes.
6. What is known as quadrative mirror filter?
7. What is fractal compression?
8. Name the types of uniform quantizer.
9. Differentiate global motion and local motion.
10. What is group of pictures?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Discuss in detail various evaluation techniques for compression. (16)

(OR)

b) Explain the following terms: (16)

i) Source encoding

ii) Vector Quantization.

12. a) What is meant by Huffman coding? Explain its types. Give some application of Huffman coding. (16)

(OR)

b) What is meant by arithmetic coding? Explain it with an example. (16)

13. a) Give a detailed description of G.722 audio coding scheme. (16)

(OR)

b) Describe the various Speech compression techniques. (16)

14. a) Explain various predictive techniques for image compression. (16)

(OR)

b) Describe the working principle of DPCM with backward adaptive prediction. (16)

15. a) Explain the DVI technology for symmetric and asymmetric motion video compression and decompression. (16)

(OR)

b) Explain the various video compression techniques. (16)

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COMPUTER SCIENCE AND ENGINEERING

18CSPE801 – Information Security

Time : 3 Hours

Maximum Marks : 100

Part A

(10 x 2 = 20 Marks)

Answer ALL Questions

1. List the critical characteristics of information.
2. Sketch the NSTISSC security model.
3. Why information security is a management problem?
4. Distinguish between attack and threat.
5. In risk management strategies why does a periodic review have to be a part of process?
6. Specify the formula for calculating risk.
7. What measurement do you use when preparing a potential damage assessment?
8. Mention the Drawbacks of ISO 17799/BS 7799.
9. Define asymmetric encryption.
10. What are the advantages and disadvantages of using honey pot or padded cell approach?

Part B

(5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) Explain the Components of an Information System. (10)

ii) Write short notes on snooping and spoofing. (6)

(OR)

b) i) Describe any five professional in information security with their role and focus. 10)

ii) Summarize about SecSDLC. (6)

12. a) i) Explain the functions of an Information security organization. (12)

ii) Write about the attack replication vectors in detail. (4)

(OR)

b) i) Discuss the ethical concepts in information security and apply the same with your dreamed organization. (12)

ii) Who are hackers? What are the levels of hackers? (4)

13. a) i) Interpret the process of asset identification for different categories. (10)

ii) What is asset valuation? List any two components of asset valuation. (6)

(OR)

b) i) Outline the risk control cycle process with its flowchart diagram. (10)

ii) Summarize the process of vulnerability identification and assessment for different threats faced by an information security system. (6)

14. a) i) Illustrate the various types of information security policies in detail and apply the same for your dreamed company. (12)

ii) Mention the Operational Controls of NIST SP 800-26. (4)

(OR)

b) i) Describe the major steps in contingency planning with neat sketch. (12)

ii) Annotate VISA International security models. (4)

15. a) i) What are the different types of intrusion detection systems (IDS)? Explain IDS. (10)

ii) Discuss different types of scanning and analysis tools available. (6)

(OR)

b) i) Write about the different generations of firewalls. (10)

ii) Define cryptography. Explain the key terms associated with cryptography. (6)

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ELECTRICAL AND ELECTRONICS ENGINEERING

18EEP23 – Industrial Electrical Systems

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. How do you calculate the fuse rating? Also draw the inverse current characteristics of fuse.
2. Draw the single line diagram of three-phase four-wire distribution system.
3. Tabulate the typical load current ratings of lamp, fan and lighting socket outlet points.
4. List out the basic requirements of commercial installation.
5. Define candle power with its unit.
6. What is flood lighting? Where is it generally used?
7. Mention the factors deciding selection of transformer for industrial electrical systems.
8. Compare the difference between MCC and PCC panels.
9. List out the advantages of process automation.
10. What is panel metering? Where are panel meters used?

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Define circuit breaker. Illustrate the construction and operating principle of Miniature Circuit Breaker (MCB) and Moulded Case Circuit Breaker (MCCB). Also compare the difference between MCB and MCCB. (16)

(OR)

b) How does the human body get electric shock? Also discuss the effect of electric current entering the human body and electrical safety practices followed as per the Indian Electricity rules (IE rules). (16)

12. a) i) Describe the different type residential and commercial wiring systems. (8)

ii) Discuss in briefly about general rules and guidelines for electrical installation. (8)

(OR)

b) i) What is current rating of main switch for residential wiring? Describe briefly about the installations of distribution board and protection devices in residential wiring. (8)

ii) Define earthing. Explain any two types of earthing systems used for residential and commercial electrical systems with a neat sketch. (8)

13. a) i) Two street lamps are 14 m apart and each lamp is fitted with a 200 C.P. lamp at a height of 5 m above the ground. Calculate the illumination at a point (8)

a) Under each lamp

b) Midway between the lamps.

ii) Estimate the number and wattage of lamps which would be required to illuminate a workshop space 60 X 15 metre by means of lamps mounted 5 metres above the working plane. The average illumination required is about 100 lux, co efficient of utilization = 0.4, luminous efficiency 16 lumens per watt. Assume a space-height ratio of unity and a candle power depreciation of 20%. Draw the lamp illumination layout. (8)

(OR)

b) i) Illustrate the construction and working principle of incandescent lamp with appropriate diagrams. (8)

ii) Discuss the factors to be considered for design of a lighting schemes for a residential and commercial premises. (8)

14. a) i) With a neat sketch, explain the construction layout of Industrial substation. (8)

ii) Name the different types of starters employed for starting of AC motors. And explain any one type of starter with a neat sketch. (8)

(OR)

b) i) Name the various schemes employed for lightning protection. And explain any one type of lightning arrester with a neat sketch. (8)

ii) Classify the types of compensation. With a phasor diagram representation explain briefly about Reactive Power Compensation. (8)

15. a) What is the role of automation in industrial electrical systems? With a neat block diagram, explain the PLC based control system design in industrial electrical systems. (16)

(OR)

b) What is SCADA? List out applications of SCADA in industrial automation systems. With a neat architecture, explain the SCADA system for distribution automation. (16)

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MECHANICAL ENGINEERING

18MEPE53 - Nuclear Engineering

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Find half-life period of a material whose radioactive decay constant is 0.0855/day.
2. What do you understand by natural radioactivity?
3. List the main purpose of reprocessing of spent fuel.
4. Write the demerits of atomic fuel.
5. Write the desirable properties of good moderator.
6. Discuss about Cladding.
7. List four names of shielding materials.
8. Why fins do are used in heat exchanger when fluid is air or gas?
9. List the specific feature of site selection of nuclear power plant.
10. Write about cooling and pressure control system.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) i) List out the difference between PWR (pressurized water) reactor and BWR (boiling water reactor). (8)

ii) Discuss about nuclear fission process, fission products and fission energy release. (8)

(OR)

b) i) Draw a neat diagram of PHWR (pressurized heavy water reactor) and explain its working. (8)

ii) Differentiate PHWR and PWR systems. (8)

12. a) i) Discuss about re-conversion enriched UF6 to UO2. (8)

ii) Discuss about extraction of Thorium and its process. (8)

(OR)

b) i) Discuss about India's Thorium resources. (8)

ii) Discuss limitation of India's Thorium conversion process. (8)

13. a) i) Discuss Plasma enrichment process of nuclear fuel with a diagram. (8)

ii) Discuss the relative merits of Gaseous diffusion process and Centrifuge process. (8)

(OR)

b) i) Discuss the environmental issues of enrichment process. (8)

ii) Write the processing steps in conversion of Uranium Ore to usable fuel. (8)

14. a) i) Discuss the general problems of reactor operation. (8)

ii) Classify atomic reactors. (8)

(OR)

b) Draw a neat diagram of PWR and explain its working. (16)

15. a) i) Discuss the safety arrangements for nuclear power plant in our country. (8)

ii) Discuss the impacts of nuclear accident on environment. (8)

(OR)

b) i) Analyze the maintenance and safety procedure is done on Kudangulam atomic power plant, Tamil nadu. (8)

ii) Discuss the waste disposal methods are used in Kudangulam atomic power plant Tamil nadu. (8)

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METALLURGICAL ENGINEERING

18MTE61 – Nano Materials

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. Differentiate nano particles and nano materials.
2. List the various methods for producing nanomaterials.
3. Define co-precipitation techniques.
4. What is spark plasma sintering?
5. What are quantum dots?
6. Mention any two applications of nano fluids.
7. How is carbon nano tube synthesized?
8. Mention the environmental issue of nanomaterials and how to overcome it.
9. State the principle of TEM.
10. List the applications of Field ion microscope.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Explain in detail the magnetic, thermal, optical, electrical, mechanical properties of nano structured materials. (16)

(OR)

b) Discuss any two types of severe plastic deformation methods for manufacturing nano particles. (16)

12. a) i) Justify the role of nano-lithography in electronics with applications. (8)

ii) Explain in detail about Physical Vapor Deposition process. (8)

(OR)

b) i) Discuss in detail about Chemical Vapor Deposition process. (8)

ii) Explain the sputtering process and laser ablation process in detail. (8)

13. a) i) Define Nano-electronics and compare Micro-Electromechanical and Nano-Electromechanical systems. (8)

ii) Write short notes on nano fluids with examples and give its application. (8)

(OR)

b) i) Explain briefly the electrical and optical applications of nanomaterials. (8)

ii) Explain in detail the fabrication of quantum dots and its applications. (8)

14. a) Explain the application of nanomaterials in solar cells, fuel cells and in biomedical applications. (16)

(OR)

b) Discuss briefly about carbon nano tubes and their types, structure, synthesis and application. (16)

15. a) Explain the working and construction of Scanning Electron microscope in detail with neat sketch. (16)

(OR)

b) Define Nano-indentation technique. Write short notes on atom probe. (16)

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CIVIL ENGINEERING

18CE801 – Construction Management

Time : 3 Hours | Maximum Marks : 100

Part A (10 x 2 = 20 Marks)

Answer ALL Questions

1. What is the difference between time oriented scheduling and resource oriented scheduling.
2. Give the significance of coding system.
3. Write the characteristic of dummy activity.
4. Define time cost trade off.
5. Illustrate project budget.
6. Differentiate between financial accounting and managerial accounting.
7. Mention the uses of quality circle.
8. What are producers rick and consumers rick?
9. What is unorganized information?
10. Write the object oriented data representation.

Part B (5 x 16 = 80 Marks)

Answer ALL Questions

11. a) Discuss in detail about the estimation of activity durations and importance of learning curve. (16)

(OR)

b) Explain the choice of construction technology and choice of construction method. (16)

12. a) In a project consisting of two activities, each activity has duration of 5 days. Activity 1and 2 has a start to start precedence relationship with 2 days lead, calculate the project duration. If activities 1 and 2 have finish to finish constraint with a 2 days lag. What is the project duration? (16)

(OR)

b) For the data given below of a construction project schedule, determine the critical; path method. (16)

Activity	A	B	C	D	E	F	G
predecessors	--	--	A, B	C	C	D	D, E
Durations	3	5	4	6	3	2	4

13. a) Discuss in detail about the elements of job status report. (16)

(OR)

b) Enumerate the different components of accounting system. (16)

14. a) Describe statistical quality control with sampling by variables. (16)

(OR)

b) Discuss the various causes of accidents in construction industry and the remedial measures to avoid it. (16)

15. a) What are the different types of project information, explain them. (16)

(OR)

b) Write short notes on (16)

i) Data base management systems and

ii) Conceptual models of databases.