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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Civil, Mech, ECE) V-Semester (CBCS) Examination

Law and Engineering

Time: 3 Hours]   [Max. Marks: 70

Answer all questions
PART – A (Marks: 5 x 2 = 10)

1   a)   Concept of ADR

    b)   Preamble

    c)   Void contract

    d)   Private Company

    e)   Cyber Stalking

PART – B (Marks: 5 x 12 = 60)

2   (a)   Define Jurisprudence and explain its nature and scope.
(OR)
    (b)   Explain the importance of Alternative Dispute Resolution system in settlement of disputes.

3   (a)   What is Social change? Explain its characteristic features.
(OR)
    (b)   Explain the salient features of Indian Constitution.

4   (a)   Define 'Contract'. Explain the essential elements of a Contract.
(OR)
    (b)   Explain the rights and duties of a buyer

5   (a)   Define Company and explain the characteristic features of a Company
(OR)
    (b)   Write a note on the powers of Directors of a Company

6   (a)   What is Patent? Explain Inventions that are not patentable.
(OR)
    (b)   Discuss the impact of pollution on mankind.

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FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. (EEE) V-Semester (CBCS) Examination
ELECTRICAL MACHINES - III

Time: 3 Hours]   [Max. Marks: 70

Answer all questions
PART-A (Marks: 5 x 2 = 10)

1. a) Write any two differences between Salient Pole and Non-Salient Pole Synchronous Machines.
    b) Define Voltage Regulation of an alternator.
    c) Write the conditions for synchronization of alternators.
    d) What is a synchronous condenser?
    e) What are the advantages of Brushless DC motor?

PART-B (Marks: 5 x 12 = 60)

2. a) What is integral slot winding and fractional slot winding? Derive the expression for pitch factor (Kp), distribution factor (Kd) and emf equation of synchronous machine.

    (OR)

    b) Explain with the neat diagram the constructional features of round rotor and salient pole synchronous machine.

3. a) Define voltage regulation. Draw the equivalent circuit and phasor diagram of a synchronous generator under unity power factor, lagging power factor and leading power factor also obtain the expression for no-load emf.

    (OR)

    b) A 3-phase star connected 1000KVA, 2500V, 50Hz alternator gave the following open circuit and short circuit test readings:

Field Current (A)	10	20	25	30	40	50
Open Circuit Voltage (V)	800	1500	1760	2000	2350	2600
Short Circuit armature current (A)	---	200	250	300	---	---

    The armature effective resistance per phase is 0.2Ω. Determine the full load percentage regulation using mmf method at i) 0.8 pf lagging ii) 0.8 pf leading

4. a) What is synchronization of alternators and what are the conditions of synchronization? Also explain the lamp methods and synchroscope method of synchronization of alternators.

    (OR)

    b) Explain the effect of change of excitation and change of mechanical power input on parallel connected alternators.

5. a) Explain why synchronous motor is not a self-starting motor also derive the power flow equations for a synchronous motor.

    (OR)

    b) Explain V and inverted V curves on a synchronous motor.

6. a) Explain the construction and operating principle of Brushless DC motor.

    (OR)

    b) Explain the various operating modes of Switched Reluctance Motor (SRM). Also describe the torque equation and torque angle characteristics of SRM.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Civil) V-Semester (CBCS) Examination

SOIL MECHANICS

Time: 3 Hours]   [Max marks: 70

Answer all questions
PART-A (Marks: 5 x 2 = 10)

1   a)   Define specific gravity and water content.
     b)   What is meant by total stresses, neutral stresses and effective stresses?
     c)   Write the factors affecting compaction.
     d)   What are the different types of shear test based on drainage conditions?
     e)   What is Taylor's stability number?

PART-B (Marks: 5 x 12 = 60)

2   a)   Explain liquidity index, consistency index, flow index and toughness index.
                                                (OR)
     b)   A soil has water content 10%, Specific gravity 2.7 and degree of saturation 35%. Find the void ratio, porosity, bulk unit weight and dry unit weight of soil.

3   a)   What is the purpose of Soil classification? List out the classification of soil and explain about textural classification.
                                                (OR)
     b)   What are the factors affecting permeability of soil? Discuss.

4   a)   Describe standard proctor test and modified proctor test. How would you decide the type of the test to be conducted in the laboratory?
                                                (OR)
     b)   Discuss the Limitations of Terzaghi's theory of consolidation. Why this theory is used despite its limitations?

5   a)   What are the three standard Tri-axial shear tests with respect to drainage conditions? Explain with reasons the situations for which each test is to be preferred.
                                                (OR)
     b)   Discuss the Factors affecting shear strength of cohesive soils and cohesion-less soil.

6   a)   Derive the expression for active and passive earth pressure with Mohr's circle.
                                                (OR)
     b)   Explain with a neat sketch the slope failure mechanisms.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech.(Mech) V-Semester (CBCS) Examination

MACHINE DESIGN

Time: 3 Hours]   [Max. Marks: 70

Answer all questions
PART-A (Marks: 5 x 2 = 10)

1 a) Define the terms Initial Tension, Centrifugal Tension and Maximum Tension in belt.
   b) Give the expression for Lewis's strength of bevel gears and state the terms in equation.
   c) Differentiate between hydrodynamic and hydrostatic lubrication of bearings.
   d) Based on the two considerations, give the formulae to design thickness of piston.
   e) Give the expression for frictional torque generated in uniform wear condition and uniform pressure condition of clutches.

PART- B (Marks: 5 x 12 = 60)

2 a) Derive the expressions for length of open belt.   (4)
   b) A flat belt is required to transmit 30 kW from a pulley of 1.5 m effective diameter running at 300 rpm. The angle of contact is 165^0. The coefficient of friction between the belt and pulley surface is 0.3. Determine, taking centrifugal tension into account, width of belt required. It is given that the belt thickness is 9.5 mm, density of belt material is 1100 kg/m^3 and the related permissible working stress is 2.5 MPa.   (8)

(OR)

   c) Power of 60 kW at 750 rpm is to be transmitted from an electric motor to compressor shaft at 300 rpm by V belts. The larger pulley diameter is 1500 mm. The centre distance between pulleys is 1650 mm and over load factor can be taken as 1.5. A belt with cross sectional area of 350 mm^2 and density 1000 kg/m^3 and having allowable tensile strength of 2 MPa. The coefficient of friction between belt and pulley can be taken as 0.28. Determine the number of belts required to transmit the power.

3   a) A reciprocating compressor is to be connected to an electric motor with the help of spur gears. The distance between the shafts is to be 500 mm. The speed of the electric motor is 900 r.p.m. and the speed of the compressor shaft is desired to be 200 r.p.m. The torque, to be transmitted is 5000 N-m. Taking starting torque as 25% more than the normal torque, determine: (i) Module and face width of the gears using 20 degrees stub teeth, and (ii) Number of teeth and pitch circle diameter of each gear. Assume suitable values of velocity factor and Lewis factor.

(OR)

   b) A pair of helical gears are to transmit 15 kW. The teeth are 20° stub in diametral plane and have a helix angle of 45°. The pinion runs at 10000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear, given σ_{es} = 618 MPa.

[P.T.O

4 a) A full journal bearing of 50 mm diameter and 100 mm long has a bearing pressure of 1.4 N/mm^2. The speed of the journal is 900 r.p.m. and the ratio of journal diameter to the diametral 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. Find: (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) Select a single row deep groove ball bearing for a radial load of 4000 N and an axial load of 5000 N, operating speed is 1600 rpm for an average life of 5 years at 10 hrs per day. Assume uniform and steady load.

5 a) Derive the expression for Euler's crippling load for column with both ends fixed condition. (8)

b) Give the expression for Rankine's formulae for designing connecting rod. (4)

(OR)

c) Design a cast iron piston for a single acting four stroke engine for the following data: Cylinder bore = 100 mm; Stroke = 125 mm; Maximum gas pressure = 5 N/mm^2; Indicated mean effective pressure = 0.75 N/mm^2; Mechanical efficiency = 80% ; Fuel consumption = 0.15 kg per brake power per hour; Higher calorific value of fuel = 42 × 103 kJ/kg; Speed = 2000 r.p.m. Any other data required for the design may be assumed.

6 a) A plate clutch having a single driving plate with contact surfaces on each side is required to transmit 110 kW at 1250 r.p.m. The outer diameter of the contact surfaces is to be 300 mm. The coefficient of friction is 0.4.

(i) Assuming a uniform pressure of 0.17 N/mm2; determine the inner diameter of the friction surfaces.

(ii) Assuming the same dimensions and the same total axial thrust; determine the maximum torque that can be transmitted and the maximum intensity of pressure when uniform wear conditions have been reached.

(OR)

b) An otto cycle engine develops 50 kW at 150 rpm with 75 explosions per minute. The change of speed from the commencement to the end of power stroke must not exceed 0.5% of mean speed on either side. Design a suitable rim section having width four times the depth so that the hoop stress does not exceed 4MPa. Assume that the flywheel stores 16/15 times the energy stored by the rim and that the work done during the power stroke is 1.4 times the work done during cycle. Density of rim material is 7200 kg/m^3.

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FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech. (EEE) V-Semester (CBCS) Examination
LINEAR IC APPLICATIONS

Time: 3 Hours]   [Max. Marks:70

Answer all Questions

Part- **A** (Marks: 5 x 2 = 10)

1 a) Draw the non-inverting op-amp circuit diagram and derive its output voltage
  b) Draw Circuit diagram of comparator using op-amp.
  c) Mention the applications of 555 timer used as Monostable and Astable operations
  d) Discuss the advantages and limitations of fixed voltage regulators.
  e) Why do we use higher order filters? Give the relationship between order of a filter and roll off rate.

Part- B (Marks: 5 x 12 = 60)

2 a) Draw the block diagram of op-amp and explain it in detail.   6M
  b) Describe the working of practical differentiator circuit. Derive the expression   6M
     for output voltage.

OR

  c) Explain how op-amp can be used as adder and subtractor.   6M
  d) Explain the terms (i) slew rates (ii) CMRR (iii) PSRR (iv) drift and list out   6M
     ideal and practical characteristics of above parameters.

3 a) Draw the circuit diagram of instrumentation amplifier using 741 op - amp and   6M
     explain its operation.
  b) Explain about Zero crossing Detector.   6M

OR

  c) With a suitable diagram and necessary expression explain about
     i) Op- amp as a comparator   ii) Op-amp as a precision rectifier

4 a) Draw the internal diagram of a 555 timer IC and explain significance of each   6M
     pin
  b) Explain the operation of astable multivibrator using 555 IC Timer.   6M

OR

  c) Design a monostable multivibrator using 555 timer to produce a pulse width of
     100 m sec.

5 a) Compare and contrast buck, boost, and buck-boost regulators in terms of their
     circuit design, operational principles, and applications.

OR

  b) Explain the working principle of a series voltage regulator using an operational
     amplifier.

6 a) Define active filter. List out different filters and sketch the frequency response   4M
     of them.
  b) Explain the operation of second order band pass filter with a neat diagram.   8M

OR

  c) Design a first order high pass filter with a cutoff frequency of 1.5 kHz, and a
     pass band gain of 3

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FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. (ECE) V-Semester (CBCS) Examination
MICROPROCESSOR AND MICROCONTROLLLER

Time: 3 Hours]   [Max. marks: 70

Answer all questions
PART-A (Marks: 5 × 2 = 10)

1. a) Draw the Timing diagram of Memory Read input operation in 8086 Microprocessor.

   b) Differentiate between Procedures and Macros.

   c) Explain the operating modes of 8255 PPI

   d) Differentiate between Microprocessor and Microcontroller.

   e) Explain addressing modes of 8051 Microcontroller with examples.

PART-B (Marks: 5 × 12 = 60)

2 a) Explain the architecture of 8086 microprocessor with a neat block diagram and explain each block in detail.

(OR)

   b) Draw the pin diagram of 8086 microprocessor in both minimum and maximum mode and explain each pin in detail.

3 a) Explain Instruction set of 8086 Microprocessor.

(OR)

   b) Write an Assembly Language Program to convert Binary to Gray code.

4 a) Draw the block diagram of 8251 USART and explain each block in detail.

(OR)

   b) Explain interfacing of Stepper Motor to 8086 Microprocessor.

5 a) Explain the architecture of 8051 Microcontroller with a neat block diagram and explain each block in detail.

(OR)

   b) Explain Port 0, Port 1, Port 2 and Port 3 functions of 8051 Microcontroller.

6. a) Draw the formats of the following:
       i) TMOD ii) TCON   iii) SCON   iv) IE v) IP

(OR)

   b) Explain interfacing of LCD to 8051 Microcontroller.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (CSE & IT) V-Semester (CBCS) Examination

PRINCIPLES OF SIGNALS AND SYSTEMS

Time: 3 Hours]   [Max Marks: 70

Answer *all* questions.

PART-A (Mark: $5 \times 2 = 10$)

1 a)   Find an even and odd components of the sequence $r[n] = u[n] - u[n-6]$.

   b)   Find the Fourier transform $G(\omega)$ of the signal $g(t) = \dfrac{1}{\pi t}$

   c)   Determine the Nyquist sampling rate and interval for the signal
        $x(t) = 3\cos(500t) + 4\sin(1000t)$

   d)   Find the L.T. of $x(t) = e^{-3t}\cos(2\pi\,100\,t)\,u(t)$

   e)   Derive the relation between DTFT and Z- Transform.

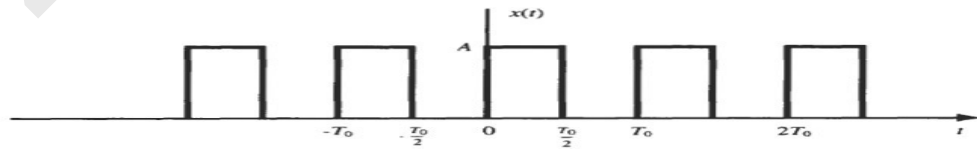PART-B (Mark: $5 \times 12 = 60$)

2 a)   Determine whether the following signals are energy, power signals, or neither.   (6)
        (i) $x(t) = A\cos(w_o t + \theta)$ (ii) $x[n] = 2e^{j3n}$

   b)   Find the trigonometric Fourier series of the following fig.   (6)
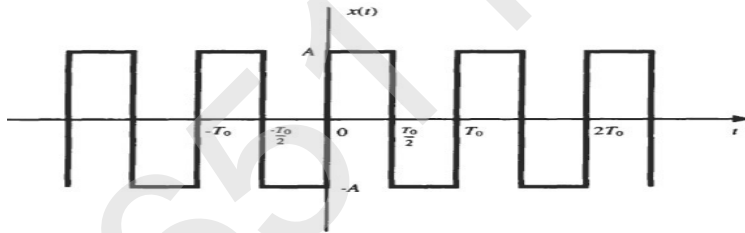
(OR)

   c)   Determine the periodicity of the following signals: (6)

        (i) $x(t) = \cos 3t + 4\sin(5t + 45^0)$ (ii) $x[n] = (-1)^{n^2}$

   d)   Determine the complex exponential series of the following fig. x(t)   (6)

3 a)   Find the Fourier transform of the following   (6)
        $(i)\quad x(t) = u(t)\cos\omega_o t$ $(ii)\quad x(t) = u(t)\sin\omega_o t$

   b)   State and prove the following properties of Fourier transform.   (6)
        (i) Frequency shifting property   (ii) Differentiation in time

(OR)

   c)   Verify Parsevel's theorem for the signal $x(t) = e^{-at}u(t),\ a > 0$ (6)

   d)   Evaluate the Discrete time Fourier transform of the signal   (6)

        $x(n) = \dfrac{1}{2}[(1/2)^n + (1/4)^n]u(n)$

4 a) Explain properties of Auto correlation and cross correlation for periodic signals. (6)

b) If y[n] denote the convolution of h[n] and g[n], where h[n] = $(1/2)^n$u[n] and g[n] is a causal sequence . If y[0]=1 and y[1]=1/2, then find g[1] . (6)

(OR)

c) State and prove sampling theorem. (6)

d) Determine the convolution of the following signals $x(t) = e^{2t}u(-t)$ and $h(t) = u(-t)$ using graphical method. (6)

5 a) Find the inverse Laplace transform of the following X(s) (6)

$$X(S) = \frac{2S + 4}{S^2 + 4S + 3} \qquad -3 < Re(S) < -1$$

b) Find the frequency response and impulse response of the system described by the differential equation. (6)

$$\frac{d^2y(t)}{dt^2} + 5\frac{d}{dt}y(t) + 6y(t) = -\frac{d}{dt}x(t)$$

(OR)

c) State and prove any four properties of Laplace transform.

6 a) Determine the z-transform of (6)
(i) x(n) = n u(n) (ii) x(n) =(n-3) u(n-3) (iii) x (n) =(n-3)u(n).

b) State and prove the initial value theorem and final value theorem for Z-transforms. (6)

(OR)

c) Find the inverse z-transform of the following function using partial fractions. (6)

$$X(z) = \frac{10}{(1-0.5z^{-1})(1-0.25z^{-1})}$$

d) Obtain the cascade realization of the system described by the difference equation (6)

$$y(n) + \frac{5}{6}y(n+1) + \frac{1}{6}y(n-2) + \frac{1}{24}y(n-3) - \frac{1}{16}y(n-4) = x(n) + \frac{5}{6}x(n-1) + x(n-2) + \frac{13}{36}x(n-3) + \frac{1}{6}x(n-4)$$

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Mining) V-Semester (CBCS) Examination

MINE HAZARDS AND RESCUE

Time: 3 Hours]   [Max Marks: 70

Answer All Questions

PART – A   (Marks: 5 x 2 = 10)

1. a)   Classify the Mine fires.

   b)   What are the types of explosions?

   c)   What is inundation explain in brief?

   d)   Describe the risk management.

   e)   What is the importance of Flame safety lamp?

PART – B   (Marks: 5 x 12 = 60)

2. a) Discuss the causes and effect of mine fires in detail.
                                    (OR)
   b) What are the parameters have to be considered for re-opening of sealed off areas?

3. a) What are the causes of underground explosions? Explain in detail.
                                    (OR)
   b) What are the causes and preventive measures for coal dust explosions?

4. a) Explain the Inundation sources of surface and underground.
                                    (OR)
   b) Discuss the sump and pumps in mining.

5. a) Describe the basic principles of risk management in detail.
                                    (OR)
   b) What are the Self Contained Breathing Apparatus (SCBA)? Explain in brief.

6. a) State the common types of flame safety lamps?
                                    (OR)
   b) Explain the Illumination arrangements of opencast and underground workings.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Data Science) V-Semester (CBCS) Examination

DATA MINING

Time: 3 Hours]   **[Max. Marks: 70**

Answer all questions

PART – A (Marks: 5 x 2 = 10)

1. a) Define the term "data mining" in your own words.

    b) What is association rule mining?

    c) Briefly explain decision tree purpose.

    d) Why cluster analysis is important?

    e) What is meant by mining data streams?

PART – B (Marks: 5 x 12 = 60)

2. a) Discuss the different types of data in data mining.

    (OR)

    b) Illustrate the role of data preprocessing in data mining.

3. a) Describe the methods used for mining frequent patterns.

    (OR)

    b) Compare and contrast various kinds of association rules.

4. a) Explain the basic concepts of classification and prediction.

    (OR)

    b) Illustrate the process of constructing a decision tree with an example dataset.

5. a) Compare partitioning and hierarchical clustering methods.

    (OR)

    b) Describe grid-based clustering methods and their applications.

6. a) Explain the process of mining time-series data and its challenges.

    (OR)

    b) Explain sequence pattern mining in transactional databases with an example.

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FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech. (AI&ML) V-Semester (CBCS) Examination
MACHINE LEARNING

Time: 3 Hours] [Max. Marks: 70

Answer all questions
PART-A (Marks: 5 x 2 = 10)

1 a) Define supervised and unsupervised learning with examples.
  b) What is a confusion matrix, and why is it important?
  c) Differentiate between polynomial kernel and Gaussian RBF kernel.
  d) How does out-of-bag evaluation improve ensemble models?
  e) Define Perceptron.

PART-B (Marks: 5 x 12 = 60)

2 a) What are the advantages of using machine learning over traditional rule-based systems? Discuss the situations where machine learning outperforms conventional methods. Describe methods to handle imbalanced datasets in machine learning.

(OR)

  b) Describe poor-quality data in machine learning and how it can affect model performance. What are some common techniques for cleaning and preprocessing data to improve its quality?

3 a) What is an ROC curve, and how is it used to evaluate classification models? Explain how the True Positive Rate (TPR) and False Positive Rate (FPR) are plotted, and what the Area under the curve (AUC) represents.

(OR)

  b) How can the k-NN algorithm be extended to multiclass classification? Discuss how the algorithm makes decisions when there are multiple classes and the role of the majority vote in the classification. Explain with an example.

4 a) Explain the basic concept of Support Vector Machines (SVM) for linear classification. How does the SVM find the optimal hyper plane, and what role do the support vectors play in this process?

(OR)

  b) Discuss the concept of kernelized SVM. How do kernel functions enable SVM to perform well in high-dimensional and nonlinear spaces? Provide examples of commonly used kernels besides the polynomial and Gaussian RBF kernels.

5 a) Explain AdaBoost and how it works to improve the performance of weak classifiers. Provide a practical example of its application. Build a Python implementation of a Gradient Boosting classifier, explaining the key steps involved in its construction and training.

(OR)

  b) Explain Random Forests and how they create multiple decision trees to generate predictions. How does this approach improve the model's performance?

6 a) Explain the concept of a Multi-Layer Perceptron (MLP). How does it differ from a single-layer Perceptron in terms of structure and functionality?

(OR)

  b) Explain the purpose of Principal Component Analysis (PCA) and its importance in data analysis. How does PCA differ conceptually and practically from manifold learning?

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Civil) V-Semester (CBCS) Examination

WATER RESOURCES ENGINEERING

Time: 3 Hours]   [Max Marks: 70

Answer all questions

PART-A (Marks: 5 x 2 = 10)

1 a) Define the terms: Full reservoir level, Maximum water level.
   b) Discuss the elementary profile of a gravity dam.
   c) State the significance of flow net in earthen dam.
   d) State the salient features of ogee spillway
   e) Write the advantages and disadvantages of Hydro-electric power station.

PART-B (Marks: 5 x 12 = 60)

2 a) Explain the methods for determining reservoir capacity for a given demand using mass curve.

(OR)

   b) Define reservoir. Mention the criteria for selection of site for a reservoir.

3 a) Explain various modes of failure of gravity dam.

(OR)

   b) Design the practical profile of a gravity dam of stone masonry given the following data: RL of base of dam =198 m; RL of HFL of reservoir =228 m; specific gravity of masonry =2.4; Safe compressive stress in masonry =1200 kN/m^2; Assume weight of masonry to be 20kN/m^3. Neglect earthquake pressure, wave pressure and silt pressure. Consider full uplift as per USBR recommendations. Determine the stability of dam.

4 a) Discuss about structural failure of an earthen dam.

(OR)

   b) Differentiate between the horizontal and vertical piping in earthen dams, suggest permanent measures to check vertical piping.

5 a) Discuss various methods used for energy dissipation below the spillways.

(OR)

   b) Classify various types of tank irrigation along with the factors governing the suitable site for their location.

6 a) Describe the various components of a hydro-electric power plant With neat sketch.

(OR)

   b) Explain the following terms:
      (i) Storage power plant (ii) Runoff River plant (iii) Pumped storage plant

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Time: 3 Hours]   [Max. Marks: 70

Answer all questions

PART – A (Marks: 5 x 2 = 10)

1 a) What are the primary objectives of production planning and control?

   b) How would you calculate the Economic Order Quantity (EOQ) for a given inventory item?

   c) What is the difference between forward scheduling and backward scheduling?

   d) What is line balancing? Explain in short.

   e) What are the primary activities performed by a dispatcher in a production setup?

PART – B (Marks: 5 x 12 = 60)

2 a) Given the following data, calculate EOQ, no of orders and total inventory cost
   - Annual demand: 8,000 units
   - Ordering cost: Rs 30 per order
   - Holding cost: Rs 5 per unit per year

(OR)

   b) List out various qualitative techniques of forecasting. Explain them in detail.

3 a) Explain Material Requirement Planning by briefly discussing the inputs, processes and outputs

(OR)

   b) Differentiate between P-System over a Q-System in inventory control comparing their merits and demerits.

4 a) Six jobs are to be scheduled on two machines. The processing times (in hours) are:

Job	Machine A	Machine B
1	5	9
2	3	6
3	8	4
4	7	5
5	6	8
6	4	7

Find the optimal job sequence to minimize idle time for both machines using Johnson's Algorithm.

OR

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b) Consider the following data for a single machine scheduling with independent jobs

Job	Processing time (Days)	Due date (Days from now)
1	9	16
2	7	20
3	5	25
4	11	15
5	6	40

Find

i) Make Span

ii) Flow time

iii) Optimum job sequence

5 a) What is aggregate planning? Explain in detail.

(OR)

b) What are the differences between level strategy and chase strategy in aggregate planning strategies?

6 a) What are the activities performed by a dispatcher in a production setup?

(OR)

b) Which dispatching method—centralized or decentralized—would you recommend for a company with multiple production sites, and why?

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (CSE, IT, EEE, Data Science, AI & ML) V-Semester (CBCS) Examination

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Time: 3 Hours]   [Max. Marks: 70

Answer all questions

Part– A (Marks: 5 x 2 = 10)

1   a)   Concept of Risk and Uncertainty
     b)   Determinants of Demand
     c)   Concept of Equilibrium
     d)   Classification of Capital
     e)   Book Keeping Vs. Accounting

Part– B (Marks: 5 x 12 = 60)

2   a)   Explain the scope of Managerial Economics.

(OR)

     b)   Briefly discuss the various concepts of Managerial Economics.

3   a)   Define Law of Demand. Explain its Assumptions & Exceptions.

(OR)

     b)   Explain in detail about the Price Elasticity of Demand.

4   a)   Explain the Law of Variable Proportions.

(OR)

     b)   Explain how price is determined under Perfect Competition.

5   a)   Explain the various sources for accumulation of Capital for the Business firm.

(OR)

     b)   A company is considering a proposal to purchase a new equipment, which involve a cash outlay of Rs. 5,00,000 and 5 years life of the project and no salvage value. Assume that the company is allowed to charge depreciation on straight line basis for income-tax purpose. The estimated before tax cash flows (EBIT) are given below:

Year	1	2	3	4	5
EBIT	1,80,000	2,20,000	1,90,000	1,70,000	1,40,000

The applicable income-tax rate is 35%. The opportunity cost of capital of the company is 10%. You are required to calculate:

(i) Payback period   (ii) ARR   (iii) NPV

[P.T.O

6   a)   Explain the procedure for Preparation of Final Accounts.

(OR)

b)   From the following figures prepare Trading and Profit & Loss Account for the year ended 31st December, 2023 and Balance sheet as on that date. The Closing Stock on 31st December, 2023 amounted to Rs. 22,500.

Particulars	Amount	Particulars	Amount
Purchases	15750	Sales	21,000
Returns inwards	600	Carriage inwards	50
Freight	265	Rent & taxes	526
Salaries	1,572	Travelling expenses	387
Opening stock	12,000	Discount allowed	225
Discount received	110	Commission paid	108
Bank balance	6147	Debtors	6,680
Trade creditors	5200	Capital	28,500
Drawings account	4500	Bills receivable	8,000
Bills payable	2000		

4980/4

FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech. (ECE) V-Semester (CBCS) Examination
ANTENNA WAVE PROPAGATION

Time: 3 Hours]   [Max. marks: 70

Answer **all** *questions*

PART-A (Marks: 5 × 2 = 10)

1 a)   What is antenna effective aperture? If the directivity of an antenna is 30, find its effective aperture at 4 GHz.
   b)   Give the importance of pattern multiplication in antenna arrays.
   c)   Mention the advantages and disadvantages of a rhombic antenna.
   d)   Differentiate the sectorial horn and pyramidal horn antennas.
   e)   Define MUF and skip distance in ionospheric propagation.

PART-B (Marks: 5 × 12 = 60)

2 a)   Derive the power radiated from a half wave dipole antenna and find the radiation resistance of a half wave dipole antenna.

(OR)

   b)   Explain the operation of a small loop antenna and compare its performance with a short dipole.

3 a)   Prove that the radiation pattern of a broadside antenna array occupies normal to array axis.

(OR)

   b)   Explain the Tschebyscheff array for an even number of elements with suitable example.

4 a)   With the help of a neat diagram, elaborate on the working of a Yagi-uda antenna.

(OR)

   b)   Design a rectangular microstrip antenna to operate at Wi-Fi frequencies. Assume 'εr' and 'h' values.

5 a)   Explain the operation of a square corner reflector antenna with the help of the method of images.

(OR)

   b)   How are dielectric antennas having advantages over conductor antennas? Mention any four dielectric materials to prepare an antenna.

6 a)   Analyze the behavior of the ionospheric layer at sky-wave propagation frequencies.

(OR)

   b)   What is line of sight propagation? Calculate the range of space wave propagation in terms of transmitting and receiving antenna heights.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Mining) V-Semester (CBCS) Examination

MINING MACHINERY

Time: 3 Hours]   [Max Marks: 70

Answer all Questions
PART – A (Marks: 5 x 2 = 10)

1. a) What are the different types of wire ropes?
    b) What is meant by back stray?
    c) What is meant by detaching hook?
    d) What is meant by headgear?
    e) What is meant by face mechanization?

PART - B (Marks: 5 x 12 = 60)

2. a) Write briefly on techno-economic indices.

    (OR)

    b) Write briefly on rope capping and rope splicing.

3. a) Write briefly about direct rope haulage.

    (OR)

    b) Write briefly about main and tail rope haulage.

4. a) Write briefly about the safety devices in winding.

    (OR)

    b) Explain briefly about koepe winding with neat sketches.

5. a) Explain briefly various shaft fittings with neat sketches.

    (OR)

    b) Explain briefly about reciprocating pump.

6. a) Write briefly about signaling system in underground mine with suitable examples.

    (OR)

    b) Write briefly about the working of air compressor.

4959/4

FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech. (Civil) V-Semester (CBCS) Examination
THEORY OF STRUCTURES

Time: 3 Hours]   [Max marks: **70**

Answer all questions
PART-A (Marks: 5 x 2 = 10)

1. a) Write down the slope deflection equation for a fixed beam AB.
   b) What is meant by carry over moment?
   c) Define rotational factor.
   d) List out the approximate method we use for frame with horizontal loads.
   e) What is the difference between two hinged and three hinged arches?

PART-B (Marks: 5 x 12 = 60)

2. a) Analyse the continuous beam shown in figure (1) by slope deflection method, if joint B is sink by 10mm. Given EI=4000KNm². Draw bending moment diagram and shear force diagram. Draw elastic curve also.
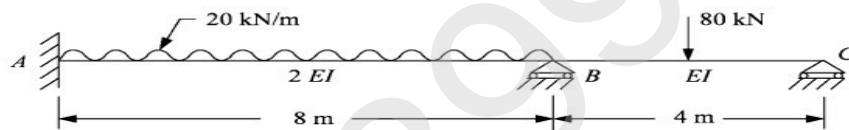
Fig(1)

(OR)

   b) A simply supported beam 5 m span carries a u.d.l. of 12 KN/m on the whole span and in addition it carries a point load of 25 KN at the centre. Calculate the maximum slope and deflection by moment area method Take E= 2 x 105 N/mm2 and I = 5500 x 104 mm⁴.

3. a) Analyse the continuous beam shown in figure (2) by moment distribution method and draw bending moment diagram. Assume EI is constant throughout.
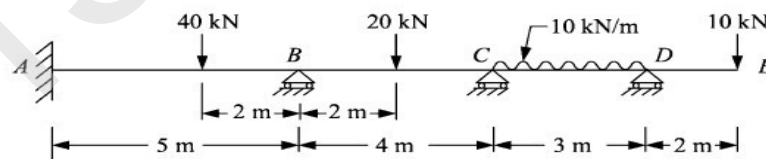
Fig(2)

(OR)

   b) Analyse the frame shown in fig (3) by moment distribution method.
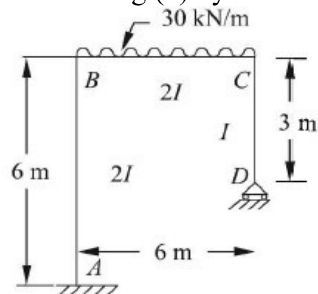
Fig (3)   [P.T.O

4. a) Analyse the continuous beam shown in figure (4) by kani's method. Draw BMD.
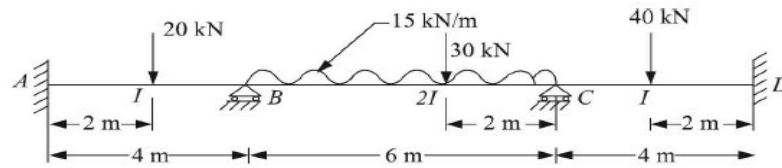
Fig (4)

(OR)

b) Analyse the rigid jointed frame shown in fig (5) by kani's method.
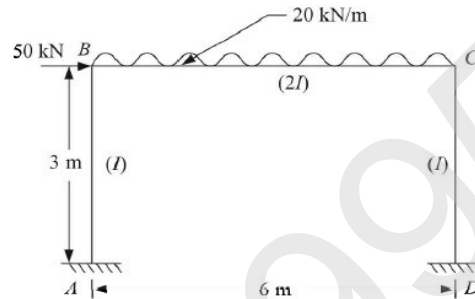
Fig (5)

5. a) Analyse the frame shown in figure(6) by factor method. Stiffness of various members are indicated in the figure.
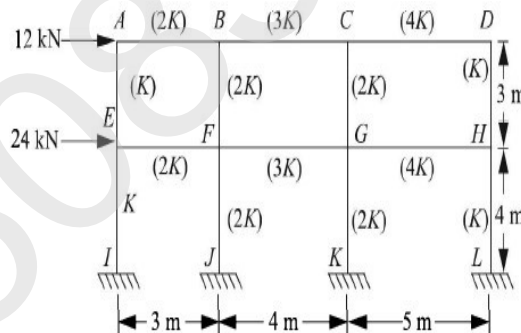
Fig (6)

(OR)

b) Analyse the frame shown in figure (7) by portal frame method.
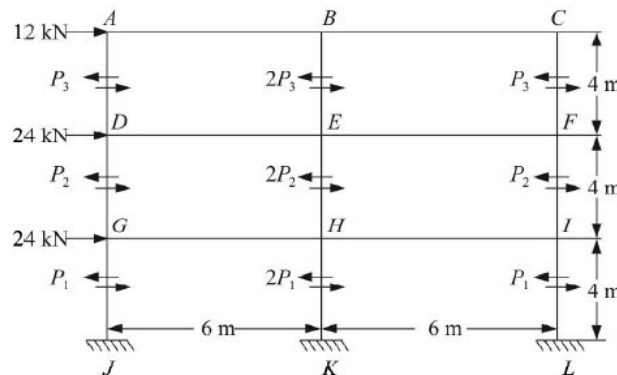
Fig(7)

6. a) A two-hinged parabolic arch of span 50 m and rise 5 meters subjected to a central concentrated load of 60 KN. It has an elastic support which yields by 0.0001 mm/KN.

Taking E = 200 KN/mm^2, I= 5 x 10^9 mm^4, Average area A_m = 10000 mm^2, α=10X10^{-6} /°C and assuming secant variation, calculate the horizontal thrust developed when the temperature rises by 20°C (i) neglecting rib shortening, (ii) considering rib shortening.

(OR)

b) A symmetrical three hinged parabolic arch of span 40m and rise 8m carries an udl of 30 kN/m over left of the span. The hinges are provided at the supports and at the center of the arch. Calculate the reactions at the supports. Also calculate the bending moment, radial shear, normal thrust at distance of 10 m from the left support.

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FACLTY OF ENGINEERING AND TECHNOLOGY
B.Tech. (Mech) V-Semester (CBCS) Examination
Prof. Elective-I (b)
NON CONVENTIONAL ENERGY SOURCES

Time: 3 Hours]   [Max. Marks: 70

Answer all questions
Part – A (Marks: 5 x 2 = 10)

1 a)   What are conventional and non-conventional energy source?
   b)   Define and briefly explain day length and surface azimuth angle.
   c)   What are hot spots?
   d)   Explain few limitation of Wave energy conversion.
   e)   What is meant by wet fermentation and dry fermentation?

Part – B (Marks: 5 x 12 = 60)

2 a)   Explain the importance of non-conventional energy sources in the present context.   (6)
   b)   What are the various site characteristics to locate the wind mill? Explain them briefly.   (6)
                                              (OR)
   c)   Explain maximum power point tracking procedure in a wind energy conversion system.   (8)
   d)   Comment on the future availability trend of fossil fuel in the world.   (4)

3 a)   Derive the relation for transmittance coefficient for the series of glass covers in flat plate   (8)
         collector.
   b)   Explain Pyrometer with the help of neat sketch.   (4)
                                              (OR)
   c)   Explain with a neat sketch, the working of photo-voltaic cell. Draw I-V characteristics.

4 a)   Describe a Hot Dry Rock geothermal resource power plant.   (6)
   b)   Explain the operation of vapour dominated geo-energy system with neat schematic   (6)
         diagram.
                                              (OR)
   c)   What are the important factors to be considered while selecting the material for MHRD   (6)
         generators?
   d)   Describe the MHD closed cycle system, with its advantages and disadvantages.   (6)

5 a)   Explain how head and flow is measured in small hydro power conversion? Describe its   (6)
         energy equation.
   b)   Describe the open and closed cycle OTEC system with a neat sketch and mention their   (6)
         advantages and disadvantages.
                                              (OR)
   c)   Describe how the wave energy is extracted from different devices.   (6)
   d)   Explain the Dolphin type wave power machine.   (6)

6 a)   What is a community biogas plant? What are the main problems encountered in its
         operation?
                                              (OR)
   b)   How are Gasifiers classified? What is Pyrolysis?   (6)
   c)   What is meant by anaerobic digestion? Explain the factors which effect Biodigestion.   (6)

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FACLTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Mech) V-Semester (CBCS) Examination

Prof. Elective-I (c)

Power Plant Engineering

Time: 3 Hours]   **[Max. Marks:70**

Answer all questions

Part – A (Marks: 5 x 2 = 10)

1. a) Discuss the various *methods of improving the efficiency* of steam power plants.
   b) What are the different types of fuel used in gas turbine power plants?
   c) What is the function of the spillway in a dam used in hydroelectric plants?
   d) What is the role of a moderator in a nuclear reactor?
   e) What is a 'Load Duration Curve' and how does it differ from a load curve?

Part – B (Marks: 5 x 12 = 60)

2. a) Discuss the *Rankine cycle* with a neat diagram. Explain the components involved, and derive the efficiency of the cycle.

(OR)

   b) What are the different types of fuel handling systems used in coal-fired power plants? Discuss their components and working.

3. a) Draw the layout of diesel engine power plant with auxiliaries and explain the working.

(OR)

   b) Explain the working of magneto hydrodynamic generator with a neat sketch.

4. a) Discuss the process of pumping and generation in a pumped storage hydroelectric power plant.

(OR)

   b) Examine the factors to be considered while selecting the site of a hydro power plant.

5. a) What are the safety concerns associated with the operation of nuclear power plants and how are these concerns addressed?

(OR)

   b) Explain the working of a Pressurized Water Reactor (PWR) and a Boiling Water Reactor (BWR).

6. a) Explain the concept of *load factor* in power plants. How it is different from capacity factor and what is their significance in plant operation?

(OR)

   b) What are the major pollutants generated by thermal power plants, and how can their impact be reduced?

4972/4
FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech. (EEE) V-Semester (CBCS) Examination
Prof. Elective-I (a)
UTILIZATION OF ELECTRICAL ENERGY

Time: 3 Hours]   [Max Marks: 70

Answer ALL questions
Part-A (Marks: 5 x 2 = 10)

1. (a) Illustrate the advantages of electric heating over other methods of heating.

    (b) Write short notes on push button and contactors.

    (c) Explain various units of light and the term luminous efficiency.

    (d) What are the different systems of railway electrification? Which one is being commonly adopted in our country and why?

    (e) What are the requirements of train lighting?

Part – B (Marks: 5 x 12 = 60)

2   (a) Explain the methods of induction heating and describe core type of induction furnace and mention the application of it?

(OR)

    (b) Explain in detail, various types of resistance welding and the associated equipment.

3   (a) Explain the direct reversing and jogging operation of Induction Motor with a neat circuit diagram.

(OR)

    (b) Explain the different interlocking methods for reversing control of Induction motors.

4   (a) Explain the working of a fluorescent lamp with the help of the circuit diagram. What is the function of choke and starter in fluorescent tube lighting?

(OR)

    (b) Estimate the number and wattage of lamps which would be required to illuminate a workshop space 60×15 metres by means of lamps mounted 5 metres above the working plane. The average illumination required is about 100 lux, coefficient of utillisation=0.4, luminous efficiency 16 lumens per watt. Assume a space –height ratio of unity and a candle power depreciation of 20%.

5   (a) For a trapezoidal speed - time curve of an electric train, derive an expression for maximum speed and distance between stops?

(OR)

    (b) Explain in detail about series- parallel control of DC motors.

6   (a) Explain the methods to obtaining unidirectional polarity in train lighting?

(OR)

    (b) Explain the construction and maintenance of lead acid batteries with a neat circuit diagram.

4981/4

FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (ECE) V-Semester (CBCS) Examination

Prof. Elective-I (a)

Digital System Design using verlog HDL

Time: 3 Hours]   [Max. Marks:70

PART- A (Marks: 5 x 2 = 10)

1. a) What is the significance of the HDL programming, and write flowchart for front end designing?

    b) Define task and function. Give any two differences between them.

    c) Classify the 74XX series of circuit configurations for HDL.

    d) Explain RAM operation and write procedural statements.

    e) Write a verilog HDL description for 2-bit Arithmetic logic Unit.

PART- B (Marks: 5 x 12 = 60)

2   a) What are the data types used for the verilog HDL? And write syntax with small example.   (6)

    b) Explain structure and hierarchy of the verilog HDL.   (6)

(OR)

    c) Define verilog programming models with an example by using neat sketch.

3   a) What are the procedural assignment statements, define those. And write some examples for those.

(OR)

    b) What is the timing constrains in verilog HDL? Explain in detail with examples.

4   a) Write a verilog HDL program for 74XX series of decoder IC with neat block diagram.

(OR)

    b) With the help of neat block diagram write a HDL program for parity generator. (6)

    c) Explain the magnitude comparator with neat sketch.   (6)

5   a) Define FSM and write a Verilog HDL program for Moore machine with on example.

(OR)

    b) Define a ROM and classify those with neat sketch. And give any two applications.

6   a) Write a verilog program for UART transmitter

(OR)

    b) Write a verilog HDL program for fixed point arithmetic multiplication

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4982/4

FACULTY OF ENGINEERING AND TECHNOLOGY

B. Tech. (ECE) V Semester (CBCS) Examination

Professional Elective I (b)

BIOMEDICAL ELECTRONICS

Time: 3 Hours]   [Max. Marks: 70

Answer **all** questions.

Part-A (Marks: 5 × 2 = 10)

1.   a) List the challenges that are faced in measurement of physiological parameters.

b) Give the frequency range of ECG and BP signals.

c) Discuss the origin of heart sounds in phonocardiography.

d) Give the principle of oximeter in measurement of pulse signals.

e) Write short notes on artificial kidney.

Part-B (Marks: 5 × 12 = 60)

2.   a) Draw and explain the block diagram of biomedical instrumentation system.

(OR)

b) Illustrate the role of electrode electrolyte interface and list its applications.

3.   a) Explain the components and working principle of sphygmomanometer

(OR)

b) Discuss the methodology of electromagnetic and ultrasonic techniques of blood flow measurement.

4.   a) With its electrodes placement and block diagram explain the pre-amplifier circuit for measurement of EEG.

(OR)

b) Illustrate the use of evoked potentials and their measurement.

5.   a) Draw and explain the block diagram of EMG instrumentation system.

(OR)

b) Explain the process of nerve conduction velocity determination using EMG.

6.   a) Describe the operational principles of ultrasonic, X-ray and nuclear imaging.

(OR)

b) Illustrate the functional operation of pacemakers, defibrillators and heart-lung machine.

4987/4

FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech.(CSE/IT/DS/AI&ML) V-Semester (CBCS) Examination

Prof. Elective-I (a)

WEB PROGRAMMING

Time: 3 Hours]   [Max. Marks: 70

Answer all questions

PART-A (Marks: 5 x 2 = 10)

1. a) Explain the purpose of a Cascading Style Sheet (CSS) in HTML.
    b) List two advantages of DHTML over HTML.
    c) Name the main components of AJAX.
    d) What is the role of AJAX when working with databases?
    e) Name one major difference between ASP and traditional HTML pages.

PART-B (Marks: 5 x 12 = 60)

2. a) Explain the structure of a HTML document. Discuss the role of tags in defining the text, images, and links in a web page, providing examples for each.

    (OR)

    b) Create a registration form using HTML. The form should include fields for username, password, email, and a submit button. Explain how forms are created and processed in HTML.

3. a) Compare and contrast HTML and DHTML. Discuss the key features that make DHTML more dynamic and interactive compared to standard HTML.

    (OR)

    b) Discuss the key features of JavaScript and how it differs from other programming languages. Explain how JavaScript interacts with HTML and CSS to create dynamic web pages.

4. a) Explain the process of using AJAX with XML and XMLHttp Request. Discuss how to access, create, and modify XML nodes.

    (OR)

    b) Differentiate between static HTML and dynamic HTML with AJAX.

5. a) Explain how AJAX works with databases. Describe how data is fetched from the database using AJAX and PHP.

    (OR)

    b) Discuss the advantages of using AJAX with PHP for real-time form validation.

6. a) Explain how variables are declared and used in ASP. Provide examples of different types of variables in ASP.

    (OR)

    b) Explain the objects in ASP, their properties, and methods with an example.

4988/4

FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech.(CSE/IT/DS/AI&ML) V-Semester (CBCS) Examination

Prof. Elective-I (b)

Advanced Java

Time: 3 Hours]   [Max. Marks: 70

Answer all questions
Part – A (Marks: 5 x 2 = 10)

1. a) Compare swings and AWT.

   b) What do you mean by collections? Give one example.

   c) Explain different types of JDBC drivers.

   d) Explain servlet life cycle.

   e) Mention the life cycle of JSP.

Part – B (Marks: 5 x 12 = 60)

2. a) Write a program to add two numbers using JButton and JTextFields.

   (OR)

   b) Write a program to handle keyboard and mouse events using event handling mechanisms.

3. a) Discuss about TCP/IP client sockets and TCP/IP server sockets.

   (OR)

   b) Write a program to demonstrate HashMap and Treemap.

4. a) What are the steps to connect to the database in java? Explain with the code for database connectivity.

   (OR)

   b) Differentiate the different types of JDBC statements.

5. a) Discuss on passing parameters to servlets?

   (OR)

   b) Explain how to handle HTTP Requests and Responses i.e., Get and Post requests in detail.

6. a) Explain how to set up the JSP environment. Also mention JSP Action elements.

   (OR)

   b) Explain JSP exception handling with a relevant code snippet.

4995/4

FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Mining) V-Semester (CBCS) Examination

MINING INSTRUMENTATION AND AUTOMATION

Time: 3 Hours]   [Max Marks: 70

Answer All Questions
PART – A   (Marks: 5 x 2 = 10)

1. a) What is meant by load cell?

   b) What is meant by geophone?

   c) What is meant by continuous monitoring?

   d) Write a short note on tilt meter.

   e) What is meant by wireless sensor network?

PART - B (Marks: 5 x 12 = 60)

2. a) Explain briefly about convergence. What are the different instruments used to measure convergence?

   (OR)

   b) Write briefly about borehole extensometer.

3. a) Write about the working of geophones.

   (OR)

   b) Write briefly about the working of high speed video cameras. Where are they used?

4. a) Write about telemonitoring in underground mines

   (OR)

   b) What are the different instruments used in underground for strata monitoring?

5. a) Explain briefly about LiDAR Technology.

   (OR)

   b) What is meant by smart drilling? Discuss about it in detail.

6. a) Write briefly on the evolution of robotic mining

   (OR)

   b) Write briefly about AWSN with neat sketches.

6331

FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech (AI&ML) V-Semester (CBCS) Examination
Prof. Elective-I (d)
Fundamentals of Data Science

Time: 3 Hours] [**Max Marks:70**

Answer all questions
Part – A (Marks: 5 x 2 = 10)

1 a) What are the three V's of big data?
  b) Why do we need statistics in data science?
  c) What is positive relationship?
  d) What is range in Python?
  e) Display current time in Python.

Part – B (Marks: 5 x 12 = 60)

2 a) Write the benefits and use of data science.
  b) Explain data cleaning techniques.
           (OR)
  c) What is data mining and explain its tasks.
  d) Give a detailed note on exploratory data analysis.

3 a) Explain quantitative, qualitative and Ranked data.
  b) Describe outliers with examples.
           (OR)
  c) Discuss histogram and frequency polygon with examples.
  d) Write a note on z-score.

4 a) What is scatter plot? Explain how to represent +ve, -ve and no relationships using it.
  b) What is correlation coefficient? Explain it for quantitative data.
           (OR)
  c) Define regression and explain it in detail for single variable.
  d) Write a note on least squared regression lines.

5 a) Explain operators in Python.
  b) Write Python code to demonstrate type casting.
           (OR)
  c) Explain if-elif-else structure in python with an example.
  d) Explain while syntax and extraction method in Python with an example.

6 a) Explain steps how to create user defined functions with an example.
  b) Give steps to define and import modules in Python.
           (OR)
  c) Explain lists and its operations in Python.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Civil) V-Semester (CBCS) Examination

CONCRETE TECHNOLOGY

Time: 3 Hours]   **[Max Marks: 70**

Answer all questions

Part – A (Marks: 5 x 2 = 10)

1. a) Define workability of Concrete.
   b) What is the significance of Gel-space ratio?
   c) What are the factors influencing mix proportions?
   d) Explain Admixtures used in preparation of self-compacting concrete.
   e) What is cellular concrete?

Part – B (Marks: 5 x 12 = 60)

2. a) Explain with help of a neat sketch, the wet process of manufacture of Ordinary Portland Cement.

   (OR)

   b) Describe the various tests for determining the quality of aggregate to be used for concreting work.

3. a) Discuss about the properties of materials which affect the performance of concrete in Hardened concrete.

   (OR)

   b) i)   Explain the factors affecting the strength of concrete   (6 M)
      ii) What are the Causes and effects-remedial measures of Thermal properties of Concrete & Micro cracking of concrete?   (6 M)

4. a) Explain how ACI method is different from BIS method of mix design.

   (OR)

   b) Write the procedure of Mix Design with reference to the provisions laid in IS -10262-2009.

5. a) Explain the importance of adding chemical admixtures in concrete and discuss any three types and their effect on the properties of concrete.

   (OR)

   b) Discuss about the Applications, concept of ready mix concrete, fly ash concrete properties and proportion of fly ash, applications, silica fume, rice husk ash concrete.

6. a) Discuss about the development and application of the following concretes   (12 M)
      i) Light weight concrete   iii) High strength concrete
      ii) geo polymer concrete   iv) pre-stressed concrete

   (OR)

   b) Describe the high performance concrete and its advantages and disadvantages.

4963/4

FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Mech) V-Semester (CBCS) Examination

DYNAMICS OF MACHINES

Time: 3 Hours]   [Max.Marks:70

Answer all questions
PART-A (Marks: 5 x 2 = 10)

1 a) What is piston effort, and how does the frictional force acting on the piston of a vertical reciprocating engine affect its operation?

   b) What is the gyroscopic effect on an airplane during a left turn when its engine rotates counter clockwise as viewed from the rear?

   c) Justify two planes of balancing masses are required in dynamically unbalanced systems.

   d) What is meant by isochronism in a governor, and how can it be proven that the Hartnell governor exhibits isochronism?

   e) Distinguish between under damping, over damping and critical damping in vibrations.

PART-B (Marks: 5 x 12 = 60)

2 a) A single cylinder vertical engine has a bore of 320mm, stroke 380mm and a connecting rod of length 760mm. The mass of the reciprocating parts is 140 kg. When the piston is at quarter stroke from T.D.C and is moving downwards, the net pressure on it is 0.6 MPa. If the speed of the engine is 250 r.p.m., Calculate the turning moment on the crankshaft at the instant corresponding to the position stated above and speed above which, other things remaining same, the gudgeon pin load would be reversed in direction.

(OR)

   b) Determine the torque to be applied to the link *AB* of a four-link mechanism shown in Fig. 1 to maintain static equilibrium at the given position.
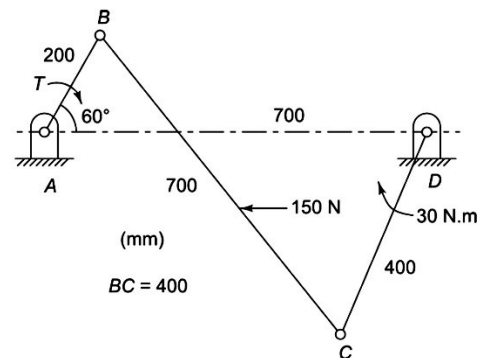
Fig.1

[P.T.O

3 a) A rail car has a total mass of 4 tonnes. There are two axles, each of which together with its wheels and gearing has a total moment of inertia of 30 kg-m². The centre distance between the two wheels on an axle is 1.5 metres and each wheel is of 375 mm radius. Each axle is driven by a motor, the speed ratio between the two being 1: 3. Each motor with its gear has a moment of inertia of 15 kg-m² and runs in a direction opposite to that of its axle. The centre of gravity of the car is 1.05 m above the rails. Determine the limiting speed for this car, when it rounding a curve of 240 meters radius such that no wheel leaves the rail. Consider the centrifugal and gyroscopic effects completely. Assume that no cant is provided for outer rail.

(OR)

b) A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 r.p.m. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the Bow. Find the gyroscopic effects in the following conditions:

i). The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.

ii). The ship pitches 6 degree above and 6 degrees below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds.

iii). The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from Bow.

Determine also the maximum angular acceleration during pitching. Explain how the directionof motion due to gyroscopic effect is determined in each case.

4 a) A rotating shaft carries four unbalanced masses 18 kg, 14 kg, 16 kg and 12 kg at radii 50 mm, 60 mm, 70 mm and 60 mm respectively. The 2nd, 3rd and 4th masses revolve in planes 80 mm, 160 mm and 280 mm respectively measured from the plane of the first mass and are angularly located at 60°, 135° and 270° respectively measured clockwise from the first mass looking from this mass end of the shaft. The shaft is dynamically balanced by two masses, both located at 50 mm radii and revolving in planes mid-way between those of 1st and 2nd masses and midway between those of 3rd and 4th masses. Determine the magnitudes of the masses and their respective angular positions.

(OR)

b) The cranks and connecting rods of a 4-cylinder in-line engine running at 1800 r.p.m. are 60 mm and 240 mm each respectively and the cylinders are spaced 150 mm apart. If the cylinders are numbered 1 to 4 in sequence from one end, the cranks appear at intervals of 90° in an end view in the order 1-4-2-3. The reciprocating mass corresponding to each cylinder is 1.5 kg. Determine: i) Unbalanced primary and secondary forces, if any, and ii) Unbalanced primary and secondary couples with reference to central plane of the engine. (By analytical method only)

5 a) A loaded governor of the porter type has equal arms and links each 250 mm long. The mass of each ball is 2 kg and the central mass is 12 kg. When the ball radius is 150 mm, the valve is fully opened and when the radius is 182 mm, the valve is closed. Find the maximum speed and range of speed. If the maximum speed is to be increased by 20% by an addition of mass to the central load, find what additional mass is required.

(OR)

b) A Wilson-Hartnell Spring loaded governor has 2.5kg rotating ball masses operating the governor between 210rpm-220rpm. Corresponding radii of ball rotation are 120mm and 165mm. Ball and sleeve arms of bell crank lever measure 180mm and 120mm respectively. Combined stiffness of two ball springs is 300N/m. Determine the stiffness of auxiliary spring attached to sleeve.

6 a) A shaft of dia 10 cm is supported by two bearings which are 160 cm apart. It carries 3 pulleys weighing 600 N, 500N and 700 N, all with in the span only. The pulley weighing 500 N is located at the mid span. The pulley weighing 600 N is 25 cm from one bearing while the pulley weighing 700 N is 37 cm from the other bearing. Determine the critical speed of the shaft. Take $E = 1.96 \times 10^{11} N/m^2$

(OR)

b) A mass attached to a spring of stiffness 600 N/m has viscous damping device. When the mass was displaced and released, the period of vibration to be 1.8 sec., and the ratio of consecutive amplitude was 4.2:1. When force F=4sin3t N acts on system, determine the amplitude, the phase angle and amplitude without dampers.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (EEE) V-Semester (CBCS) Examination

Measurements and Instrumentation

Time: 3 Hours]   **[Max. Marks: 70**

Answer all questions

PART-A (Marks: 5 x 2 = 10)

1. a) What is an error?
   b) What is the working principal of induction type energy meter?
   c) Compare DC and AC bridges.
   d) Explain the "Effect of secondary open circuit" in current transformer.
   e) What is thermocouple? Give uses.

PART-B (Marks: 5 x 12 = 60)

2. a) Explain basic characteristics of an instrument in detail.

   (OR)

   b) Explain the construction, principle of operation of PMMC instrument with the help of neat diagram.

3. a) Explain in detail and give the torque equation of dynamometer type wattmeter

   (OR)

   b) Explain the construction and working principal of induction type energy meter.

4. a) Explain the Kelvin's Double Bridge for measurement of unknown resistance and also derive the balanced condition.

   (OR)

   b) Explain in detail about Maxwell's inductance bridge and draw its pharos diagram

5. a) Explain the construction and working of potential transformer in detail.

   (OR)

   b) Explain the construction and principle of operation of co-ordinate type A.C. Potentiometer.

6. a) Explain in detail about cathode ray oscilloscope.

   (OR)

   b) Discuss briefly about LVDT. Also mention its advantages and disadvantages

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (ECE) V-Semester (CBCS) Examination

ANALOG AND DIGITAL COMMUNICATION

Time: 3 Hours]   [Max. Marks: 70

Answer **all** questions.

PART-A (Marks: 5 × 2 = 10)

1.   a) Define the term modulation and explain the need for modulation
     b) Compare all analog modulation techniques with reference to figure of merit.
     c) Draw the block diagram of a pulse code modulation system.
     d) List the salient features of linear block codes.
     e) Give the differences between binary and M-ary signalling schemes.

PART-B (Marks: 5 × 12 = 60)

2.   a) Explain the generation, demodulation of SSB-SC and VSB-SC modulation schemes with
        necessary mathematical equations.

(OR)

     b) Illustrate the demodulation process of FM Foster-sely discriminator and AM envelope
        detector.

3.   a) Draw and explain the functional operation of FM transmitter and receiver.

(OR)

     b) Derive an equation for figure of merit of FM demodulator.

4.   a) Explain the generation, demodulation of PWM and PPM modulation systems.

(OR)

     b) Give the fundamental principle of DPCM, DM and adaptive DM.

5.   a) With considering a suitable example discuss the process of error detection and correction
        using binary cyclic codes.

(OR)

     b) A discrete memory less system is emitting the symbols m_1, m_2, m_3, m_4, m_5, m_6 and m_7
        with probabilities 1/2, 1/4, 1/8, 1/16, 1/32, 1/64 and 1/64. Apply Shanon-Fano algorithm
        to code the above message symbols.

6.   a) With necessary block diagram discuss the functional operation of ASK, PSK modulator
        and demodulator.

(OR)

     b) Draw and explain the methodological operation of direct sequence spread spectrum
        communication system.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (CSE & IT) V-Semester (CBCS) Examination

DATABASE MANAGEMENT SYSTEMS

Time: 3 Hours]   [Max. Marks: 70

Answer All Questions

PART-A (Marks: 5 x 2 = 10)

1   a)   What are the levels of abstraction in a DBMS?
    b)   Define a relation in the context of a relational database.
    c)   Define SECOND Normal form.
    d)   What methods are used to assign timestamps to transactions?
    e)   What are index data structures, and how do they improve query performance?

PART-B (Marks: 5 x 12 = 60)

2   a)   Explain the concept of data models in DBMS. Describe the hierarchical, network, and relational data models with appropriate examples. Discuss their key advantages and limitations.

(OR)

    b)   Explain the evolution of DBMS from traditional file systems to modern systems. What are the drawbacks of file systems, and how does DBMS overcome them?

3   a)   Explain the division operation in relational algebra with a suitable example and discuss the usage of 'GROUP BY' and 'HAVING' clauses in SQL with an example.

(OR)

    b)   Discuss about domain relational calculus. How we can convert relationship sets with key constraints into tables? Explain.

4   a)   Explain the different normal forms based on functional dependencies, and discuss dependency-preserving decomposition.

(OR)

    b)   Explain the different types of constraints in SQL, such as PRIMARY KEY, FOREIGN KEY, UNIQUE, and CHECK, and provide examples of how each is used in table creation.

5   a)   What is a transaction in a DBMS? Explain the ACID properties with simple examples.

(OR)

    b)   What are the locking techniques in DBMS? Provide examples of how they prevent conflicts between transactions.

6   a)   Compare sequential, heap, and indexed file organizations in DBMS. Discuss their pros and cons regarding storage, retrieval speed, and query performance.

(OR)

    b)   What are cluster indexes in a DBMS? Explain how they work and when they improve database performance.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Mining) V-Semester (CBCS) Examination

ROCK MECHANICS

Time: 3 Hours]   [Max Marks: 70

Answer All Questions

PART – A   (Marks: 5 x 2 = 10)

1. a) Define the terms Young Modulus and Poisson ratio.
   b) Define term core recovery.
   c) Write the differential equilibrium equations for a solid in three dimensions?
   d) What are the different instruments used in rock mechanics applications?
   e) What is the significance of the Mohr–Coulomb failure envelope in rock mechanics?

PART - B (Marks: 5 x 12 = 60)

2. a) i) Explain the method of determining the Protodyaknov's index of rocks.
   ii) A soil sample weighs 200 grams in its natural state. After oven drying, its weight is 160 grams. The volume of the sample is 100 cm³, and the specific gravity of solids is 2.7. Determine Moisture content and Void ratio?

(OR)

   b) i) A cylindrical sample of 54 mm diameter is subjected to an axial compressive load of 100 k N. if the failure plane is at 60 degrees with respect to the horizontal, find the values of the shear and the normal stresses on the failure plane?
   ii) Describe the procedure for conducting a uni-axial compressive strength test on a cylindrical rock sample. Include formulas and interpretation of results?

3. a) i) In a borehole log of 1.2 m in length, Recovery of rock cores in cm is given below 20,8,15,8,8,4,3,9,10,1,5,10 Calculate the RQD in percentage.
   ii) Explain the significance of the Q-System in tunnel design.

(OR)

   b) i) Explain the term Geological Strength Index (GSI) and its estimation method.
   ii) State the factors that influence rippability classification in excavation projects.

4. a) The maximum and minimum principal stresses acting on a two mutually Perpendicular planes are 20 MPa and 10 MPa respectively. Calculate the normal and   shear stresses on an inclined plane, ө = 30° with reference to the maximum principal plane. Also calculate the maximum and minimum shear stresses and their angles. Verify the results using Mohrs circle.

(OR)

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b) i) What is the difference between plane stress and plane strain?

ii) A bore hole is drilled and instrumented, yielding the following values of the components in the plane perpendicular to the bore hole

Б x = 1.724 MPa

Б y = 2.76 MPa

τ xy = -0.689 MPa

Find the magnitudes and directions of the major and minor principal stresses on this Place.

5. a) i) How does water content affect the strength and deformability of rocks?

ii) Describe the mechanism of creep in rocks.

(OR)

b) i) What is a rheological model, and how is it used in studying rock behavior?

ii) Describe the role of dynamic loading in rock failure.

6. a) i) Describe the Hoek-Brown theory of failure?

ii) Differentiate between cohesion and friction angle in the context of Coulomb's failure criterion.

(OR)

b) i) Describe the Griffith theory of failure.

ii) What are the limitations of Coulomb's failure criterion in real-world applications?

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Data Science / AI & ML) V-Semester (CBCS) Examination

Software Engineering

Time: 3 Hours]   [Max Marks:70

Answer all Questions
Part-A (Marks: 5 x 2 = 10)

1. a) List and define software myths.
   b) What are system requirements? Give examples?
   c) What type of different architectural styles exists?
   d) Differentiate validation and verification? Give an example?
   e) What is the difference between reactive and proactive risks?

Part-B (Marks: 5 x 12 = 60)

2. a) Explain the CMMI model in detail. How it is useful?

(OR)

   b) With a neat diagram explain the waterfall mode. How it is different from agile model?

3. a) Discuss in detail about functional and non-functional requirement with suitable
       examples. What does the software requirements document contain?

(OR)

   b) In detail explain the requirement engineering process steps.

4. a) What are different design concepts and design models? Explain.

(OR)

   b) Give the class, use case and sequence diagram for ATM application. Discuss.

5. a) How do you differentiate white box and black box testing? How an user interface is
      tested?

(OR)

   b) Describe the testing strategy for conventional software? What is art of debugging?

6. a) Explain the metrics used to check the software quality?

(OR)

   b) What are the types of ISO 9000 quality standards? In detail explain and compare
      them.

4961/4

FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech (Civil) V-Semester (CBCS) Examination
DISASTER MANAGEMENT

Time: 3 Hours]   [Max.Marks : 70

Answer all questions
PART-A (Marks: 5 x 2 = 10)

1. a) What are the concept of environmental stress and disaster?
   b) What is meant by emerging disaster?
   c) What are the climatological hazards?
   d) What is risk mapping and its assessment in disaster stage?
   e) List out the non-governmental agencies.

PART-B (Marks: 5 x 12 = 60)

2. a) Explain about the disaster Management and their terminology used in the disaster management?

   (OR)

   b) What are the differential impacts of disaster in terms of social status, location, and disabilities of people in India?

3. a) How can you classify the hazard and what are consequences?

   (OR)

   b) Explain weather related hazards by some of the examples that occurred.

4. a) What are the stages that can explain about the disaster management cycle?

   (OR)

   b) Explain about the Paradigm shift in disaster management.

5. a) Explain the disaster risk management profile in INDIA.

   (OR)

   b) What are the National Guidelines and plans on Disaster management?

6. a) Explain the technological approach in disaster risk management.

   (OR)

   b) What are the structural and non-structural mitigation of disasters?

4962/4

FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech (Mech) V-Semester (CBCS) Examination
FLUID MECHANICS AND HYDRAULIC MACHINES

Time: 3 Hours]   **[Max. Marks : 70**

Answer all questions.
PART – A (Marks: 5 x 2 = 10)

1 (a) Define the terms: (i) absolute pressure (ii) Gauge Pressure.
   (b) Mention the applications of Impulse- Momentum equation.
   (c) Define the term impact of jet.
   (d) What are the different efficiencies of a centrifugal pump?
   (e) What are the functions of an air vessel?

PART – B (Marks: 5 x 12 = 60)

2 (a) A triangular plate of base width 1.5 m and height 2 m lies immersed in water with the **(6)** apex downwards. The base of the plate is 1 m below and parallel to the free water surface. Calculate the total pressure on the plate and the depth of the centre of pressure.

   (b) A 400 mm diameter shaft is rotating at 200 rpm in a bearing of length 120 mm. If the **(6)** thickness of the oil film is 1.5 mm and dynamic viscosity of the oil is 0.7 Ns/m^2, determine the torque required to overcome friction in bearing (Assume a linear velocity profile.

(OR)

   (c) A solid cylinder of diameter 4 meters has a height 3 meters. Find the meta centric height **(6)** of the cylinder when it is floating in water with its axis vertical. The specific gravity of the cylinder is 0.6.

   (d) What do you understand by the hydrostatic equation? With the help of this equation **(6)** derive the expression for buoyant force acting on a sub merged body.

3 (a) Water under a pressure of 345 kN/m^2 flowing through a 30 cm diameter pipe at the rate **(8)** of 0.25 m^3/s. If the pipe is bending by 135^0, find the magnitude and direction of the resultant force on the bend. Neglect losses.

   (b) Differentiate the following. (a) Lagrangian method and Eulerian method (b) Steady and **(4)** unsteady flow (c) Laminar and turbulent flow

(OR)

   (c) Prove that the ratio of maximum velocity to average velocity of flow of viscous fluid through pipe is 2.

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4 (a) A turbine is to operate under a head of 25 meters at 200 rpm. The discharge is 9 m^3 /sec. **(6)**
If the turbine efficiency is 90% determine: (i) specific speed of the turbine (ii) power generated (iii) performance under a head of 20 meters. Also state the type of the turbine.

(b) What is the importance of a draft tube in a Francis turbine? Discuss different types of **(6)** draft tubes.

(OR)

(c) A Kaplan Turbine is to be designed to develop 9100KW. The net available head is 5.6m. If the speed ratio= 2.09, flow ratio = 0.68, overall efficiency =86% and the diameter of Boss is 1/3 the diameter of runner. Find the diameter of runner, its speed and the specific speed of the turbine.

5 (a) How can you classify centrifugal pumps? **(4)**

(b) A centrifugal pump runs at 800 rpm and delivers 5000 L/min against a head of 7 m. The **(8)** impeller has an outer diameter of 25 cm and a width of 5 cm at the outlet. If the backward curved vane at the outlet makes an angle of 45^0, determine the manometric efficiency. What is the specific speed of the pump?

(OR)

(c) A centrifugal pump has vanes which are radial at the outer periphery. The impeller has an outer diameter of 20 cm and a width of 3 cm at that diameter. If the discharge is 1800 L/min and the net head produced is 3.5 m, calculate the (i) rotational speed of the impeller and (ii) magnitude and direction of absolute velocity at exit. Manometric efficiency can be assumed as 0.85.

6 (a) Explain the constructional features of the Reciprocating pump with neat sketch. **(6)**

(b) A single acting reciprocating pump running at 50rpm, delivers 0.01m^3 /s of water. The **(6)** diameter of the piston is 200mm and stroke length 400mm. determine the theoretical discharge of the pump and co-efficient of discharge, and slip and the percentage slip of the pump.

(OR)

(c) What is indicator diagram? Prove that work done by a reciprocating pump is **(6)** proportional to the area of indicator diagram.

(d) A single acting reciprocating pump has a piston diameter of 150mm and stroke length of **(6)** 350mm. The centre of the pump is 3.5m above the water surface in the sump and 22m below the delivery water level. If the pump is working at 30 rpm, determine the power required to drive the pump.

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FACULTY OF ENGINEERING AND TECHNOLOGY
B.Tech. (EEE) V-Semester (CBCS) Examination
LINEAR CONTROL SYSTEMS

Time: 3 Hours]   **[Max Marks: 70**

Answer all questions
PART – A (Marks: 5 x 2 = 10)

1 a) Explain the effect of feedback on system gain stability and sensitivity.

   b) Define rise time and peak time.

   c) What are the limitations of Routh's stability?

   d) What are frequency domain specifications?

   e) Write the properties of State transition matrix.

PART – B (Marks: 5 x 12 = 60)

2 a) Explain about open loop and closed loop systems by giving suitable examples and also
       highlight their merits and demerits.

(OR)

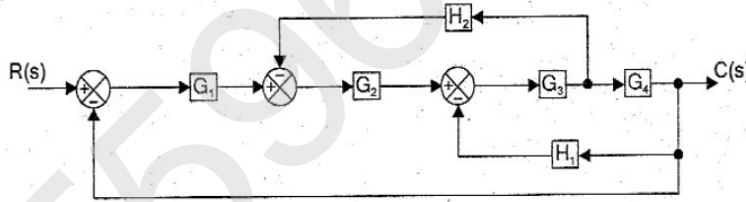   b) Reduce the block diagram in **fig. 1** and obtain its overall transfer function.

fig. 1

3 a) Explain about time domain specifications of a second order control system.

(OR)

   b) The open loop transfer function of a servo system with unity feedback is given by
       $G(S) = \frac{10}{(S+2)(S+5)}$. Determine damping ratio, undamped natural frequency and
       percentage maximum overshoot for a unit step input.

4 a) Examine the stability of the following system using R-H criterion.

   $S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16 = 0$.

(OR)

   b) Sketch the root locus plot for the unity feedback system whose Open loop transfer
       function is given by

$$G(S) = \frac{K}{S(S + 2)(S + 4)}$$

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5 a) For a unity feedback control system

$$G(S) = \frac{10}{S(0.02S + 1)(0.2S + 1)}$$

Obtain Bode plot.

(OR)

b) Explain about Lead compensator and draw its pole –zero diagram.

6 a) Discuss the concept of controllability and observability with an example.

(OR)

b) Determine State Transition Matrix whose system matrix A= $\begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix}$.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (ECE) V-Semester (CBCS) Examination

Control System Engineering

Time: 3 Hours]   [Max Marks: 70

Answer all questions

PART – A (Marks: 5 x 2 = 10)

1   a)   Explain the Mason's gain formula.
    b)   Derive the expression for transfer function from a state model.
    c)   Define steady state error.
    d)   Define gain margin and phase margin.
    e)   Define compensator. What are its advantages?

PART – B (Marks: 5 x 12 = 60)

2   a)   Explain about open loop and closed loop systems by giving suitable examples and also highlight their merits and demerits.

(OR)

    b)   Derive the transfer function of armature controlled dc servomotor also draw its block diagram.

3   a)   Obtain state model for $\dfrac{Y(S)}{u(S)} = \dfrac{s^2 + 3s + 4}{s^3 + 2s^2 + 3s + 2}$.

(OR)

    b)   Check controllability and observability.

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -2 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ -1 \end{bmatrix} U.$$

$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + U.$$

4   a)   The open loop transfer function of a servo system with unity feedback is given by

$G(S) = \dfrac{10}{(S+2)(S+5)}$. Determine damping ratio, undamped natural frequency and percentage maximum overshoot for a unit step input.

(OR)

    b)   Sketch the root locus plot for the unity feedback system whose Open loop transfer function is given by

$$G(S) = \dfrac{K}{S(S+2)(S+4)}$$

{P.T.O

5   a)   For a unity feedback control system $G(S) = \dfrac{10(s+10)}{S(S+2)(S+5)}$ Obtain Bode plot.

(OR)

b)   Sketch Polar plot and determine gain margin for the transfer function

$$G(S) = \frac{1}{S(S+1)(2S+1)} \cdot$$

6   a)   The open loop transfer function is $G(S) = \dfrac{4}{S(S+4)}$ Design a lead compensator for the system so that Static velocity error constant is 20 sec^{-1}, phase margin is at least 50 degrees and gain margin is 10 dB.

(OR)

b)   Explain about P, PI and PID controllers and obtain its transfer function.

4985/4

FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (CSE & IT) V-Semester (CBCS) Examination

Theory of Computation

Time:3 Hours]   [Max Marks:70

Answer all questions

PART-A (Marks: 5 x 2 = 10)

1 a) What is non deterministic finite automata?
   b) Write the applications of regular expressions.
   c) Define left linear and right linear grammars.
   d) Write the acceptance of push down automata.
   e) Define P and NP problems.

PART – B (Marks: 5 x 12 = 60)

2 a) Design Finite automata and explain its mathematical and graphical representations.
   b) Design Finite automata which accept even number of 0's and even no of 1's.

(OR)

   c) Write the steps to reduce the finite automata.
   d) Write a note equivalence of two automata.

3 a) Write the procedure to design regular expression from automata.
   b) Construct the regular expression for the following automata.
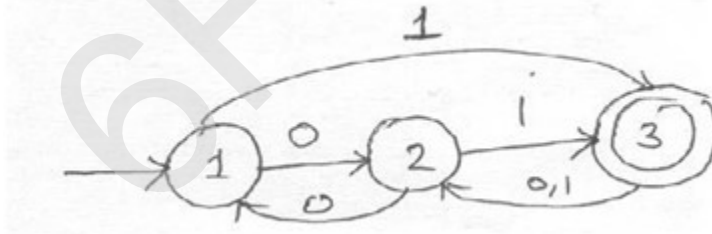
(OR)

   c) Describe finite automata with output in detail.
   d) Show that the following language is not regular $L=\{X^i /i$ is prime$\}$

4 a) Explain Chomsky Hierarchy of Grammar.
   b) What is context free grammar? Design CFG for the language $L=\{a^n b^{2n} /n=1\}$

OR

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c) What is ambiguity grammar? Explain with an example.

d) Find the reduced grammar for the following

S→0A0/1B1/BB

A→C

B→S/A

C→S/€

5 a) What is Push Down Automata and explain its working principle and Construct PDA: Accepting the set of all strings over {x, y} with equal number of x's followed by equal number of y's.

(OR)

b) Define Chomsky normal form and explain the procedure to convert grammar into CNF?

c) Convert the following grammar into CNF

S → ASB , A → aAS|a   B → SbS|A|bb

6 a) What is Turing machine? Explain its working principle with a neat sketch.

b) Design Turing Machine for L={$WW^R/W \in \{a,b\}^+$}

(OR)

c) Write a note on
   i. Linear bound automata
   ii. Post correspondence problem
   iii. Recursive and Recursive Enumerable languages.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Mining) V-Semester (CBCS) Examination

UNDERGROUND MINING METHODS (COAL)

Time: 3 Hours]   [Max Marks: 70

Answer All Questions
PART – A   (Marks: 5 x 2 = 10)

1. a)   State the advantages of circular shafts over other geometrical shapes.
    b)   State the factors considered while selecting panel size.
    c)   List Continuous miner units and their role in extraction of coal.
    d)   State the applicable conditions of plough.
    e)   State the applicable conditions of blasting gallery method.

PART - B (Marks: 5 x 12 = 60)

2. a) Describe factors affecting choice of mining methods

(OR)

    b) Classify coal grades based on Gross calorific value of coal

3. a) Explain briefly about the development of steep seams in bord and pillar method

(OR)

    b) Explain briefly on short wall mining method

4. a) Explain briefly about the extraction of contiguous seams

(OR)

    b) Explain the preparatory arrangements before starting depillaring operation

5. a) Compare Longwall advancing versus Longwall retreating

(OR)

    b) Explain briefly about Push sumping in Longwall extraction by shearer

6. a) Explain briefly about horizon mining method

(OR)

    b) Explain briefly about caving methods.

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FACULTY OF ENGINEERING AND TECHNOLOGY

B.Tech. (Data Science / AI&ML) V-Semester (CBCS) Examination

Operating System

Time: 3 Hours]   [Max. Marks: 70

Answer All Questions

PART – A (Marks: 5 x 2 = 10)

1   a)   List the different objectives of operating system
    b)   What is process control block?
    c)   What do you mean by starvation?
    d)   What is demand paging?
    e)   What is file? List out various file attributes.

PART – B (Marks: 5 x 12 = 60)

2   a)   What is operating system? Explain about various types of operating systems.

(OR)

    b)   Describe about monolithic structure of operating system and what are the advantages of layered structured over monolithic structure.

3   a)   Describe the differences among short term, medium-term, long-term scheduling.   (4)
    b)   Explain about system calls **fork**, **exit**, **wait** and **exec**.,   (8)

(OR)

    c)   What is CPU Scheduling? Explain about FIFO CPU scheduling algorithm with an example.

4   a)   Write a short note on: (4)
         (i) Critical section (ii) Race condition
    b)   Discuss about producer consumer problem in detail.   (8)

(OR)

    c)   Write about deadlock in detail.   (4)
    d)   Discuss about deadlock prevention methods.   (8)

5   a)   Explain the following page replacement algorithms with examples:
         i) Optimal page replacement
         ii) Least recently used page replacement algorithm

(OR)

    b)   What is Directory?   (4)
    c)   Discuss about different file Access methods briefly.   (8)

6   a)   Discuss any two disk scheduling algorithms with suitable examples.

(OR)

    b)   Write about principles of protection.   (4)
    c)   Explain the implementation of access matrix.   (8)