R-20 **Code : 20CE41E7**

B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech. I Semester
RAILWAY, AIRPORT AND HARBOUR ENGINEERING
(Civil Engineering)

Time : 3 hours Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) Describe the classification of Indian Railway lines based on speed criteria.

  (b) Discuss the role of railways in industrial and economic progress of a nation.

2 (a) Explain different types of sleepers with its advantages and disadvantages.

  (b) What are the requirements of ballast?

SECTION - II

3 (a) Discuss various types of switches in detail.

  (b) Enumerate different types of crossings.

4 Write a short note on different types of station yards with the aid of neat sketches, explain the functioning and types of a marshalling yard.

SECTION - III

5 (a) What are the various components of airport? Explain about terminal area.

  (b) List out various aircraft characteristics.

6 With a typical airport layout, describe the various components of airports along with their functions.

SECTION - IV

7 (a) What is meant by runway orientation? Explain the orientation of runway with the help of wind rose diagram of type II.

  (b) Describe the techniques of energy recovery from conversion products.

8 (a) The length of runway under standard conditions is 2000m. The elevation of airport site is 300 m. Its reference temperature is 33.55°C. If the runway is to be constructed with an effective gradient of 0.25%, determine the corrected run way length.

  (b) Explain the concept of blast considerations.

SECTION - V

9   (a)   Explain the factors governing the characteristics of water waves.

     (b)   Explain the advantages and disadvantages of water transportation.

10   (a)   What are the types of docks and shapes of docks?

     (b)   Enumerate the factors to be considered for the selection of site for harbor.

SECTION - VI

11   What are Navigational aids? Briefly describe the different types of Floating signals.

12   What are the various characteristics of Mound break water and rubble mound break water? Discuss the advantages and disadvantages of both types in detail.

R-20   **Code : 20SH41E1**

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

MANAGEMENT SCIENCE
(Common to CE, EEE, ECE, CSE, IT & AI&DS)

Time : 3 hours   Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION – I

1 (a) Discuss the challenges to management in the new millennium.

   (b) What are the assumptions of Douglas McGregor about the behavior of the managers?

2 (a) Briefly describe Henry Fayol's 14 principles of management.

   (b) Summarize the differences between Leader and Manager.

SECTION – II

3 (a) Explain matrix and virtual organization with merits and demerits.

   (b) Define social responsibility. Explain the social responsibility of business to its deferent segments.

4 (a) Describe line & Staff Organization structure and Functional Organization Structure.

   (b) What you understand by 'managerial objectives'? Give any four managerial objectives.

SECTION – III

5 (a) Define marketing. How is it deferent from selling? Discuss.

   (b) Illustrate different stages in Product Life Cycle.

6 (a) Briefly explain the concept of SWOT by taking an example of your choice.

   (b) Examine the concept of corporate planning. Discuss the steps in corporate planning.

SECTION – IV

7 (a) Outline the steps in manpower planning.

   (b) Discuss the general steps involved in a selection process.

8 (a) Describe various methods of Job evaluation.

   (b) Define performance appraisal. Discuss steps in performance appraisal.

SECTION – V

9 (a) Explain in brief the factors determining the location of an industrial plant.

   (b) Demonstrate product and process layout with examples.

10 (a) Define work study. Discuss the benefits of Work study.

(b) Describe the basic procedure involved in method study and work measurement.

SECTION – VI

11 (a) Differentiate between PERT and CPM.

(b) List out the rules for drawing network.

12 a) Define the terms slack, float, EST, EFT, LFT, LST. Explain with an example of your choice.

(b) Find the duration of the project, Variance of Critical Path, Probability of completing the project in 30days.

Activity	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
TO(T1)	6	4	3	6	7	1	2	5	3
TM(T2)	9	7	3	5	9	11	7	6	8
TP(T3)	7	11	9	5	13	7	11	8	13

R-20

Code : 20CE41EA

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

CONSTRUCTION PLANNING & MANAGEMENT
(Civil Engineering)

Time : 3 hours

Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) Describe the significance of construction management.

   (b) List out the objectives of construction management.

2 (a) Describe various stages involved in construction industry.

   (b) Explain the importance of Engineering Drawings in construction management.

SECTION - II

3 A project consists of 8 activities A, B, C, D, E, F, G and H with their times of completion as follows:

Activity	A	B	C	D	E	F	G	H
Duration (weeks)	2	4	2	4	6	4	5	4

The precedence relationships are as follows:
A and B can be performed in parallel, C and D cannot start until A is complete, E cannot start until half the work of activity C is complete., F can start only after activity D is complete, G succeeds C, H is the last activity which should succeed E.
   i) Outline the bar chart.
   ii) What is the total time to complete the project?

4 Find the optimum duration of the project and the corresponding minimum cost. Draw time scaled version of network. The indirect cost of the project are Rs 3000 per week.

Activity	Normal duration (weeks)	Normal cost (Rs)	Crash duration (weeks)	Crash cost (Rs)
1-2	6	7000	3	14500
1-3	8	4000	5	8500
2-3	4	6000	1	9000
2-4	5	8000	3	15000

SECTION - III

5 (a) What is grading equipment? Describe the advantages of using grading equipment in construction industry.

   (b) List out the types of cranes. How can cranes play an important role in construction?

6   (a) Describe any two types of pumping and dewatering equipment used in construction site with their applications.

    (b) Explain various types of concrete mixing equipment used in construction site.

SECTION - IV

7   (a) Why inspection is necessity in construction management.

    (b) Express the principles of inspection.

8   (a) Describe ethical audit procedures with example.

    (b) Explain the importance of audit reviews in construction management.

SECTION - V

9   (a) Explain the importance of safety in construction site.

    (b) Describe risk benefit analysis.

10 (a) List out the principles of organization.

    (b) Express advantages and limitations of temporary services in construction industry.

SECTION - VI

11 (a) What is trade union? Why trade union is connected with construction industry?

    (b) Explain the current status of construction labour.

12 (a) Summarize the advantages and limitation of Minimum Wages Act, 1948.

    (b) Explain the significance of Labour Welfare Fund act,1965.

R-20   **Code : 20ME4103**

Time : 3 hours   Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) Describe in detail the anatomy of an industrial robot.

   (b) Explain the following terms related to robotics
        (i) Stability   (ii) Repeatability   (iii) Resolution   (iv) Accuracy

2   Sketch and explain the basic robot configurations classified according to the coordinate system.

SECTION - II

3 (a) Discuss about the salient features of stepper and servo motor with limitations.

   (b) Briefly explain the working principle and applications of following sensors :
        (i) Optical Encoder and   (ii) Tactile sensor

4   Describe the types of end effectors & gripper mechanisms with simple sketches.

SECTION - III

5 (a) Differentiate servo and non-servo-controlled robots.

   (b) Briefly explain continuous and intelligent robots.

6 (a) Explain the steps involved in trajectory planning.

   (b) Differentiate Cartesian and joint space trajectory planning.

SECTION - IV

7 (a) Explain the forward solution of 2R robot manipulator.

   (b) State the important steps in Denavit-Hartenberg (D-H) convention.

8 (a) Briefly explain robot dynamics.

   (b) Find the transformation matrix for the following operations on the point $3i+7j+5k$. Rotate 30^0 about x-axis and then translate-5 units along y-axis.

SECTION - V

9 (a) Distinguish between textual programming and lead through programming.

   (b) Discuss various capabilities and limitations of the robot programming languages.

10   Explain about the following commands used in Rapid programming language.
(i) MoveL   (ii) MoveJ   (iii) MoveC and   (iv) MoveAbs

SECTION - VI

11   (a)   Explain the robot applications in material transfer and machine loading /unloading.

     (b)   What is a robot work cell? Explain different robot work cell layouts.

12   (a)   Briefly explain the methods of economic analysis of Robots.

     (b)   List out safety considerations of robot operations.

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

SOLID WASTE MANAGEMENT
(Civil Engineering)

Time : 3 hours　　　　　　　　　　　　　　　　　　　Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1　　Discuss the various factors that may account for the large differences in the generation of solid wastes in municipalities of several industrial nations around the world.

2　　What is your present concept of resource recovery? How can it affect the costs of solid waste disposal?

SECTION - II

3　　Discuss the possibilities and advantages of a regional solid waste management plan for metropolitan area near your home.

4　　Describe the general trends you would expect in the future in the generation of the following types of wastes in your community:
　　(i) food wastes　　(ii) paper wastes.

SECTION - III

5　　List the advantages and disadvantages associated with the home separation of solid wastes, and devise a workable separation scheme for the home separation of paper and colored glass.

6　　Write a brief note for the following :
　　(i) Residential Collection Service　　(ii) Commercial –Industrial Service

SECTION - IV

7　　List out eight different processing techniques for solid wastes and also write advantages and disadvantages in outline form.

8　　How chemical conversion products are derived and also explain clearly the recovery of chemical conversion products.

SECTION – V

9　　What are the factors to be considered in evaluating potential solid waste disposal sites and explain any four factors in detail?

10　(a)　Write clearly the advantages and disadvantages of sanitary landfill.

　　(b)　Clearly explain the ocean disposal of solid wastes.

SECTION - VI

11　　What are the five general categories of hazardous wastes and also explain each one of them in detail.

12　　With the help of neat sketches explain the onsite storage of hazardous wastes.

R-20

Code : 20EE41E8

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

UTILIZATION OF ELECTRIC POWER

(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1 (a) State and Explain laws of illumination.

(b) A lamp of 500 C.P. is suspended 4 meters above horizontal surface. Calculate the Illumination (i) Directly below the lamp (ii) 3 meters away from the vertical axis.

2 Describe the construction and working of high pressure mercury vapour lamp.

SECTION - II

3 (a) What are the specific advantages of dielectric heating?

(b) Explain in detail about electric heating.

4 Describe the construction and working of any type of induction furnace.

SECTION - III

5 Explain the resistance welding with help of neat sketch. Give its merits and demerits with respect to arc welding.

6 What are the different types of electric arc welding? Explain the submerged Arc welding with help of neat sketch.

SECTION - IV

7 What is an electric drive? What are its advantages? Compare a group drive and an individual Drive.

8 Draw and Explain Speed current and torque current chrecristics in respect of D.C. Series motor and D.C. shunt motor.

SECTION - V

9 What are the advantages and disadvantages of electric traction over other types of traction Systems?

10 Discuss various systems of track electrification.

SECTION - VI

11 Discuss various factors affecting specific energy consumption in the electrical traction.

12 (a) Define the following :
   (i) Adhesive Weight   (ii) Coefficient of adhesion   (iii) Tractive effort

(b) Explain the mechanics of train movement.

R-20

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

ELECTRICAL AND HYBRID VEHICLES
(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Describe the historical background of electric and hybrid vehicle history.

   (b)   Explain the Comparisons of Hybrid Electric Vehicles and Conventional Vehicles.

2   (a)   Draw the force velocity characteristics of electric vehicle.

   (b)   Derive the expression for calculation of tractive power and energy required by Electric vehicle.

SECTION - II

3   (a)   Explain the various power flow control modes for a series hybrid vehicle.

   (b)   Explain the Impact of modern Drive Trains on Energy Supplies.

4   (a)   Discuss various electric drive train topologies.

   (b)   Explain the configuration of drive trains in electric vehicles.

SECTION - III

5   Explain the multi-quadrant control of DC motor drives.

6   (a)   Explain the configuration of Induction motor drives.

   (b)   Explain the control of Induction motor with Vector control implementation.

SECTION - IV

7   (a)   Discuss various Energy Storage Requirements in Hybrid and Electric Vehicles.

   (b)   Describe nickel-based batteries in Energy storage systems.

8   (a)   Explain the working principle of a fuel-cell.

   (b)   Explain the hybridization of different energy storage sources of Hybrid and Electric Vehicles.

SECTION - V

9   (a)   Explain the design of a Hybrid Electric Vehicle (HEV).

      (b)   Write a short note on sizing the power electronics to Hybrid Electric Vehicle.

10   (a)   Explain any two specifications of power electronics in HEV.

      (b)   Write the factors for selecting the energy storage technologies.

SECTION - VI

11   (a)   What are the selections of communications in Hybrid Electric Vehicles?

      (b)   Explain the communication protocol of Hybrid Electric Vehicles.

12   Explain the different energy management strategies.

R-20   **Code : 20CS4102**

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B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

PYTHON PROGRAMMING - II
(Electrical & Electronics Engineering)

</div>

Time : 3 hours   Max. Marks :60

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*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

</div>

1   (a)   How to Create an array with an Existing Data?

       (b)   What is an Array? How do you add new Axis to an Array?

2   (a)   How do You Know the Size and Shape of an Array?

       (b)   Explain the Basic Array Operations in detail .

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SECTION – II

</div>

3   (a)   Illustrate to get Unique Items and Counts using matrices.

       (b)   Discuss Reshaping and Flattering Multi-Dimensional Arrays.

4   (a)   Summarize Reverse an Array in detail.

       (b)   Describe the Creating Matrices with example .

<div align="center">

SECTION – III

</div>

5   Discuss the following with examples.
         i) Merge   ii) Grouping   iii) Reshaping data

6   Write a short note on series and data frames.

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SECTION – IV

</div>

7   Elaborate anatomy and customization of a Matplotlib Plot.

8   (a)   Illustrate the Features of Matplotlib.

       (b)   Demonstrate about Visualization Examples.

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SECTION – V

</div>

9   Implement the Supervised Learning with an example.

10   How to set The Problem and Loading with an Example Datasets?

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SECTION - VI

</div>

11   What are the Spatial Data Structures and Algorithms?

12   Discuss the Special Functions in Scipy with examples ▸

R-20   Code : 20EE41E4

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

SWITCHGEAR AND PROTECTION
(Electrical & Electronics Engineering)

Time : 3 hours   Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   Describe the function and operation of a fuse? Why fuses cannot provide adequate ?

2   Discuss what is meant by a circuit breaker and phenomenon of arc formation in a circuit breaker ?

SECTION - II

3   Explain the operation of SF6 circuit breaker with relevant sketch in a detailed manner ·

4   In 110 k V system the phase to ground capacitance is 0.01 μ F. the inductance is 8H. Calculate the voltage appearing across the pole of C.B, if a magnetizing current of 5 A is interrupted. Calculate the value of resistance to be used across the contact space to eliminate the striking voltage transient.

SECTION - III

5   Define and explain the following terms as applied to protective relaying.
(a)Pick-up value (b) Current setting (iii) Plug-setting multiplier (iv) Time-setting multiplier ·

6   Classify the various types of over current relays and give their applications along with approximation characteristics ·

SECTION - IV

7   Explain negative sequence relay with neat sketch ·

8   Discuss the main drawback of differential over current protection for bus bars and how is it overcome, Explain clearly about Buchholz relay for the protection of incipient faults in transformers.

SECTION - V

9   Describe the differential pilot wire method of protection of feeders·

10 A star connected, 3 phase, 10 MVA, 6.6KV alternator has a per phase reactance of 10%. It is protected by Merz-price circulating-current principle which is set to operate for fault currents not less than 175A. Calculate the of earthling resistance to be provided in order to ensure that only 10% of the alternator winding remains unprotected.

SECTION - VI

11   Describe the construction and working principle of Expulsion type arrester with neat sketch.

12   (a)   Define a voltage surge? Draw a typical lightning voltage surge.

      (b)   Explain the term insulation coordination. Describe the construction of volt-time curve and terminology associated with impulse testing.

R-20   **Code : 20EE41E4**

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

SWITCHGEAR AND PROTECTION
(Electrical & Electronics Engineering)

Time : 3 hours   Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

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       (b)   Explain the term insulation coordination. Describe the construction of volt-time curve and terminology associated with impulse testing.

B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech. I Semester
CELLULAR MOBILE COMMUNICATION
(Electronics & Communication Engineering)

Time : 3 hours   Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1 (a) Infer the importance of Cell Splitting in the cellular system.

   (b) What are the advantages and disadvantages of Omni-directional Antenna system.

2 (a) Define performance criteria of cellular mobile system.

   (b) Identify the basic block diagram of Cellular system and describe.

SECTION - II

3 (a) List the types of non-co-channel interference.

   (b) Determine the C/I in the design of Omni-directional antenna system for K=7 frequency reuse system in the worst case.

4 (a) Discuss about Signal reflections in flat and hilly terrain environment.

   (b) Find the Offered load when a cellular system maximum calls per hour in one cell is 3000 and an average calling time is 1.76 min, at the blocking probability of 2%.

SECTION - III

5 (a) Interpret trade-off action between cell site and mobile antennas.

   (b) Is lowering of antenna height decrease or increases the co-channel interference? Justify.

6   Describe about Signal reflections in flat and hilly terrain environment.

SECTION - IV

7 (a) Identify the four conditions should be used to compare the results of co-channel interference.

   (b) List types of antennas used at cell site.

8 (a) Prepare the design procedure of Omni directional antenna cellular system.

   (b) Extrapolate the need for diversity receiver cellular communication.

SECTION - V

9   (a)   Define channel assignment. Differentiate between static and dynamic channel assignment.

     (b)   Differentiate Delayed Handoff and Forced Handoff.

10   (a)   List the conditions when hand-off is needed. Describe various types of hand-offs

     (b)   List the characteristics of Hand-off .

SECTION - VI

11   (a)   What is the need of multiple access technique in cellular system? Mention different types of multiple access techniques used in cellular system.

     (b)   Write short notes on Message structure of TDMA and Frame offset.

12   (a)   Draw the GSM architecture and explain.

     (b)   Identify any four differences between GSM and CDMA.

B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech. I Semester

DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

Time : 3 hours   Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1   (a)   List and explain the fundamental steps in digital image processing.

      (b)   Discuss briefly the following:
              i) Neighbors of pixels   ii) connectivity

2   (a)   Non uniform sampling is useful for what type of images? Give reasons.

      (b)   With the help of diagrams discuss the human visual perception system.

SECTION - II

3   (a)   Describe the Haar transform in image processing with suitable expressions.

      (b)   Explain 2-D Discrete Fourier Transform and specify any three properties.

4   (a)   Explain the significance of Hotelling transform.

      (b)   Describe Fast Fourier Transform.

SECTION - III

5   (a)   Why histogram equalization is needed? Illustrate histogram equalization with an example.

      (b)   Explain the basic concept of any two methods piecewise linear transformation function used in image enhancement.

6   (a)   A 3-bit image of size 4×5 is shown below. Compute the histogram equalized image.

0	1	1	3	4
7	2	5	5	7
6	3	2	1	1
1	4	4	2	1

      (b)   Explain various image enhancement techniques performed in spatial domain.

SECTION - IV

7   (a)   With relevant mathematical expressions, explain how Wiener filter achieves restoration of a given degraded image?

      (b)   Explain linear position invariant degradation employed for image restoration.

8   (a)   Explain region splitting and merging technique used for image segmentation with suitable examples.

    (b)   What is edge detection? Describe in detail about the types of edge detection operation.

SECTION - V

9   (a)   Explain the schematics of image compression standard JPEG 2000.

    (b)   Explain Huffman coding with an example.

10 (a)   Define Compression and explain data Redundancy in image compression.

    (b)   Describe in detail the lossless predictive coding error free compression.

SECTION - VI

11 (a)   Explain the operation of color image smoothing and sharpening.

    (b)   Explain about RGB color model.

12 (a)   Explain pseudo color image processing and pseudo color coding approaches.

    (b)   Describe the histogram based processing in color images.

R-20   **Code : 20CS4103**

Time : 3 hours   Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Explain the types of machine learning.

     (b)   Write a note on Cross Validation.

2   (a)   Explain Hypothesis space and Inductive bias.

     (b)   Differentiate Decision trees, over fitting.

SECTION - II

3   (a)   Describe K-nearest Algorithm.

     (b)   Write a note on Decision Trees.

4   (a)   Explain briefly the functions of decision trees for Pattern Classification.

     (b)   Differentiate Decision trees, over fitting.

SECTION – III

     (a)   Describe K-nearest Algorithm.

5   (b)   Explain Collaborative filtering-based recommendation.

6   (a)   Describe K-Nearest Neighbor algorithm. Why is it called instance based learning?

     (b)   Explain the concept of Bayesian Network with an example.

SECTION - IV

7   (a)   Explain artificial and biological networks.

     (b)   Explain the types of Neural Network.

8   (a)   Differentiate between artificial neuron and biological neuron.

     (b)   Explain McCulloch-Pitts neuron model and elementary logic networks.

SECTION - V

9   (a)   Describe pattern classification.

     (b)   Explain the concept of Multilayer Feed Forward Network.

10   Explain in detail about Error Back Propagation Algorithm with necessary
            equations.

SECTION - VI

11 (a) Write a note on PAC learning.

   (b) List out the merits and demerits of Advanced Hierarchical Clustering.

12 (a) What is the need of Ensemble classifiers? Discuss how it improves the classification accuracy.

   (b) Write the ensemble techniques in machine learning.

R-20

B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech. I Semester
VLSI DESIGN
(Electronics & Communication Engineering)

Time : 3 hours   Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) Discuss the different steps involved in IC fabrication process.

    (b) Explain about BiCMOS fabrication in a n-well process with a diagram

2   Describe briefly the following approaches to CMOS Fabrication:
       (i) P-well Process   (ii) Twin tub Process

SECTION - II

3 (a) Explain and derive the expressions for MOS transistor parameters gm, gds and ω0.

    (b) Explain Pass transistor and Transmission gates with neat sketches.

4 (a) Draw the circuit diagram of nMOS Inverter and discuss its transfer characteristics.

    (b) Compare CMOS and Bi-CMOS technologies.

SECTION - III

5 (a) What do you mean by inverter delay? Explain.

    (b) Discuss about the circuit concepts like Writing capacitances and Driving large capacitive loads.

6 (a) Explain the 2μm CMOS design rules for contacts and transistors.

    (b) Briefly discuss about scaling of MOS circuits and its limitations.

SECTION - IV

7 (a) What are the alternate gate circuits are available, explain them with suitable sketch?

    (b) Design NOR gate by using CMOS.

8 (a) Explain about VLSI physical design placement and rooting .

    (b) Discuss briefly about the Power delay estimation in VLSI.

SECTION - V

9   (a)   Draw the basic block diagram of 4-bit adder and explain its operation in detail.

      (b)   What are the different types of comparators? Explain any one with example.

10   (a)   Discuss any two types of programming technology used in FPGA design.

      (b)   Compare CPLD and FPGA.

SECTION - VI

11   (a)   What is meant by Simulation? Explain the various VHDL simulations.

      (b)   Discuss the Design Capture Tools in detail.

12   (a)   Discuss with the Built-in self-test.

      (b)   Explain about the test generation in detail.

B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech. I Semester
VLSI DESIGN
(Electronics & Communication Engineering)

Time : 3 hours   Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Discuss the different steps involved in IC fabrication process.

    (b)   Explain about BiCMOS fabrication in a n-well process with a diagram

2   Describe briefly the following approaches to CMOS Fabrication:
          (i) P-well Process   (ii) Twin tub Process

SECTION - II

3   (a)   Explain and derive the expressions for MOS transistor parameters gm, gds and ω0.

    (b)   Explain Pass transistor and Transmission gates with neat sketches.

4   (a)   Draw the circuit diagram of nMOS Inverter and discuss its transfer characteristics.

    (b)   Compare CMOS and Bi-CMOS technologies.

SECTION - III

5   (a)   What do you mean by inverter delay? Explain.

    (b)   Discuss about the circuit concepts like Writing capacitances and Driving large capacitive loads.

6   (a)   Explain the 2μm CMOS design rules for contacts and transistors.

    (b)   Briefly discuss about scaling of MOS circuits and its limitations.

SECTION - IV

7   (a)   What are the alternate gate circuits are available, explain them with suitable sketch?

    (b)   Design NOR gate by using CMOS.

8   (a)   Explain about VLSI physical design placement and rooting .

    (b)   Discuss briefly about the Power delay estimation in VLSI.

SECTION - V

9   (a)   Draw the basic block diagram of 4-bit adder and explain its operation in detail.

      (b)   What are the different types of comparators? Explain any one with example.

10   (a)   Discuss any two types of programming technology used in FPGA design.

      (b)   Compare CPLD and FPGA.

SECTION - VI

11   (a)   What is meant by Simulation? Explain the various VHDL simulations.

      (b)   Discuss the Design Capture Tools in detail.

12   (a)   Discuss with the Built-in self-test.

      (b)   Explain about the test generation in detail.

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

STATISTICAL METHODS
(Mechanical Engineering)

Time : 3 hours   Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1. Calculate the mean and standard deviation for the following table giving the age distribution of 542 members of a club:

Age (in years)	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of members	3	61	132	153	140	51	2

2. The means of two single large samples of 1,000 and 2,000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches? (Test at 5% level of significance).

SECTION - II

3. (a) Let p denote the probability of getting a head when a given coin is tossed once. Suppose that the hypothesis H_0: p=0.5 is rejected in favour of H_1:p=0.6 if 10 trails result in 7 or more heads. Calculate the probabilities of type I and type II error.

   (b) P is the probability that a given die shows even number. To test H_0: p=1/2 against H_1: p=1/3, following procedure is adopted. "Toss the die twice and accept H_0 if both times it shows even number". Find the probabilities of type I and type II error.

4. Explain (a) Null and Alternative hypothesis
   (b) Critical Region
   (c) Type I and Type II error.
   And also write What are the steps involving for testing the hypothesis problem.

SECTION - III

5. Two independent groups of 10 children were tested to find how many digits they could repeat from memory after hearing them. The results are as follows:

Group A	8	6	5	7	6	8	7	4	5	6
Group B	10	6	7	8	6	9	7	6	7	7

Is the difference between the mean scores of the two groups significant?

6. (a) Derive Chi-Square distribution and its characteristic function.

   (b) The demand for a particular spare part in a factory was found to vary from day-to-day. In a sample study the following information was obtained.

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
No. of parts demanded	1124	1125	1110	1120	1126	1115

Test the hypothesis that the number of parts demanded does not depend on the day of week.

SECTION - IV

7   What is control chart? Explain the basic principles underlying the control charts. Discuss the role of control charts in manufacturing process.

8   A machine is set to deliver the packets of a given weight. Ten samples of size five each were examined and the following results were obtained.

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean ($\bar{X}$)	43	49	37	44	45	37	51	46	43	47
Range (R)	5	6	5	7	7	4	8	6	4	6

Calculate the values for the central line and the control limits for the mean chart and range chart.

SECTION - V

9   The following table gives quality rating of the service stations by five professional raters.

Rater	Service Station									
	1	2	3	4	5	6	7	8	9	10
A	99	70	90	99	65	85	75	70	85	92
B	96	65	80	95	70	88	70	51	84	91
C	95	60	48	87	48	75	71	93	80	93
D	98	65	70	95	67	82	73	94	86	80
E	97	65	62	99	60	80	76	92	90	89

Analyze the data and discuss whether there is any significant difference between raters or between service stations.

10   Consider the results given in the following table for an experiment involving six treatments in four randomized blocks. The treatments are indicated by numbers within parentheses. Test whether the treatments differ significantly.

Blocks/Yield	I	II	III	IV	V	VI
I	(1) 24.7	(3) 27.7	(2) 20.6	(4) 16.2	(5) 16.2	(6) 24.9
II	(3) 22.7	(2) 10.2	(1) 21.2	(4) 19.1	(6) 22.5	(5) 17.0
III	(6) 26.3	(4) 19.6	(1) 38.5	(3) 36.8	(2) 39.5	(5) 15.4
IV	(5) 17.7	(2) 31.0	(1) 28.5	(4) 14.1	(3) 34.9	(6) 22.6

SECTION – VI

11   Obtain the value of correlation coefficient between X and Y for the following data:

X	43	44	46	40	44	42	45	42	38	40	42	57
Y	29	31	19	18	19	27	27	29	41	30	26	10

12 (a) Explain what are regression lines. Also derive the regression equations

     (b) Define Line of regression and Regression Coefficients. Find the equations to the lines of regression.

R-20   **Code : 20ME41E2**

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

REFRIGERATION AND AIR-CONDITIONING

(Mechanical Engineering)

Time: 3 hours   Max. Marks: 60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Define Refrigeration and also write its necessity & practical Applications.

     (b)   A refrigeration machine of 6 tons capacity working on Bell-Coleman cycle has an upper
           limits of pressure is 6bar. The pressure and temperature at the starting of compression is
           1 bar and 289K. The compressed air, cooled at constant pressure to a temperature of
           320K enters the expansion valve. Calculate.
           (i)COP (ii) Quantity of air circulation per minute (iii) Power required to run the unit
           (iv) Piston displacement and bore for compressor and expander if unit runs at 240 r.p.m
           and stroke length is 200 mm. Assume it as double acting and γ= 1.4, Cp = 1.003 kJ/kgK.

2   (a)   Derive an expression for COP of vapour compression cycle when the refrigerant is dry
           saturated before compression.

     (b)   Distinguish between Vapour compression system with Vapour absorption refrigeration
           system.

SECTION - II

3   (a)   Generate the refrigerant numbers for the following chemicals
           (i) CF_4 (ii) $CHCL_2F$ (iii) CH_3Cl (iv) C_2ClF_5

     (b)   List out various desirable properties of refrigerants.

4   (a)   Discuss about the working of reciprocating compressor with a neat sketch.

     (b)   Water cooled condensers are more effective than air cooled condensers. Justify.

SECTION - III

5   (a)   Which type of defrosting is used in modern refrigerators and explain the working of it
           with a neat sketch.

     (b)   In Most of the modern refrigerators, why the defreezer box is kept at the top?

6   (a)   Describe the method of charging refrigeration system with a circuit diagram.

     (b)   Summarize the merits of capillary tube over thermostatic expansion valve.

SECTION - IV

7 (a) Define the Following terms related to Air Conditioning system DBT, DPT, Relative Humidity, Specific Humidity, Degree of saturation.

(b) Draw the following psychometric processes on psychometric chart:
(i) Heating and Humidification (ii) Adiabatic humidification
(iii) Cooling and dehumidification

8 A theatre of 1500 seating capacity is to be air-conditioned for winter conditions when the following data is known: Outdoor conditions are 12^0C and 60% R.H, Required conditions are 20^0C and 60% R.H, Amount of air supplied is 0.25 cmm per person. The required conditions are achieved by heating, humidification and again heating. The air coming out of the humidifier has 80% R.H. Then find the following
(a) Heating capacity of the first heater in kW and the condition of the air coming out of the heating coil. Also find the surface temperature of the coil if the bypass factor is 0.4
(b) The capacity of the humidifier
(c) Heating capacity of the second heater in KW
(iv) By pass factor if the surface of the coil is maintained at 24^0C

SECTION - V

9 (a) Illustrate the working of year round air conditioning system with a neat sketch.

(b) Represent various lines in comfort chart.

10 (a) List out the automatic controls used in an A/C systems and explain them briefly.

(b) Write the factors affecting the effective temperature.

SECTION - VI

11 (a) Describe the liquefaction of hydrogen with a neat sketch.

(b) How refrigeration is helpful in food processing and preservation?

12 (a) Compare Air cooler with an Air-conditioning systems.

(b) With the help of a neat sketch describe the working of Water cooler.

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

FINITE ELEMENTS METHOD
(Mechanical Engineering)

Time : 3 hours   Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
*All Questions carry equal marks*
* * *

SECTION - I

1   (a)   List out the applications of FEM and mention the significance of FEM in solving Engineering Problems.

(b)   In a plane strain problem, σx=1300MPa, σy=-120MPa, Young's Modulus E=205 GPa and Poisson's ratio μ=0.25. Determine the value of σz.

2   Find the strain matrix by selecting an interpolation function for a bar element in its natural coordinates.

SECTION - II

3   (a)   Derive elemental equations for 1D bar element.

(b)   Explain in brief the Principle of Stationary Total potential (PSTP).

4   Evaluate the nodal displacements, element stresses and support reactions of the bar Shown in Figure? Young's modulus of the material of the bar = 2.1×10^5 N/mm^2.
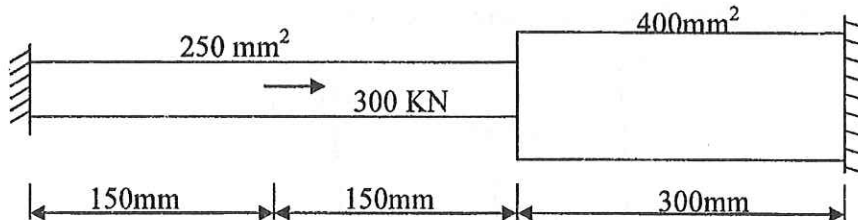
SECTION - III

5   The figure depicts an assembly of two bar elements made of different materials. Estimate the nodal displacements, element stresses, and the reaction force. E_1=220GPa & E_2=150 GPa
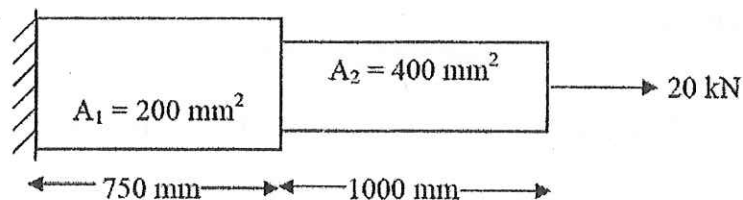
6   Determine the forces in the truss members shown below in Fig. Take $E = 200\text{GPa}$, $A = 2000 \text{ mm}^2$.
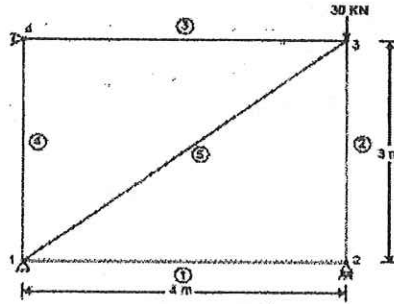
SECTION - IV

7   Heat is generated in a large plate (thermal conductivity $k = 0.8$ W/m°C) at the rate of 4000 W/m³. The plate is 0.25 m thick. The outside surfaces of the plate are exposed to ambient air at 30 °C with a convective heat transfer coefficient of 20 W/m²°C. Enumerate the temperature distribution in the

8   (a)   Derive elemental equations for flow through pipes.

   (b)   Derive shape functions for a fixed beam loading with a concentrated load P at the center.

SECTION - V

9   (a)   Differentiate plane stress and plane strain problems with respect to Finite Element Methods.

   (b)   The nodal displacements of four node quadrilateral element shown in figure are given as $Q = [0, 0, 0.01, 0.02, 0.05, 0.01, 0.10, 0.02]^T$ cm. Take $E = 20 \times 10^6$ N/cm² and $\mu = 0.25$. Determine the Jacobian matrix, and strain displacement matrix at $\xi = 0$ & $\eta = 0$. Assume plane stress condition.
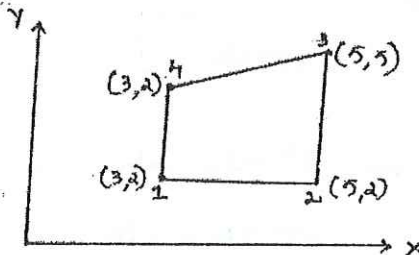
10   Compute the strain displacement matrix [B] and also the strains of an axi-symmetric triangular element with the coordinates r1 = 3 cm, z1 = 4 cm, r2 = 6 cm, z2 = 5 cm, r3 = 5 cm, z3 = 8 cm. The nodal displacement values are q1 = 0.01 mm, q2 = 0.01 mm, q3 = 0.01 mm, q4 = -0.04 mm, q5 = -0.03 mm, q6 = 0.07 mm.

SECTION - VI

11   Evaluate the integral $f(r) = \int_{-1}^{1} (r^2 - 3r + 7) dr$ using Gaussian quadrature that the result is exact.

12   Evaluate the Eigen values, Eigen vectors and natural frequencies of a beam of cross section 360 cm² and of length 600mm. Assume Young's modulus as 200GPa, density 7850 kg/m³ and moment of inertia of 3000 mm4. Make into two elements of 300 mm in length each.

R-20

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech I Semester

AUTOTRONICS
(Mechanical Engineering)

Time: 3 hours   Max.Marks:60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1 (a) Outline major components of an automobile and explain the functions of each.

   (b) Explain the use of flywheel in an internal combustion engine.

2 (a) Draw the schematic layout of all wheel drive vehicle and discus the function of each component.

   (b) Explain the construction and working of Cartridge type oil filter.

SECTION - II

3 (a) In detail discuss the classification of electronic fuel injection system.

   (b) What are the limitations of a simple carburetor? Discuss in detail the special features of modern carburetor with suitable diagrams.

4 (a) Discuss the advantages of electronic ignition system compared to the conventional ignition system.

   (b) Describe in detail: i) Semiconductors ii) Transistors.

SECTION - III

5 (a) Discus the applications of microcomputer in an automobile vehicle.

   (b) Show and explain the block diagram of microprocessor.

6 (a) Outline major components of engine management system.

   (b) Explain various types of electronic panel meters.

SECTION - IV

7 (a) Discuss Zirconium dioxide type exhaust gas oxygen sensor.

   (b) Describe the working of crank shaft position sensor.

8 (a) Explain the working fuel metering sensor used in an automobile vehicle.

   (b) With a neat sketch explain the working of Solenoid actuator.

SECTION – V

9   (a)   Discuss social and environmental importance of electrical vehicle.

        (b)   Explain environmental impact analysis on greenhouse caused by the hybrid vehicle.

10   (a)   Discuss electric and hybrid vehicle with neat sketches.

        (b)   What are the limitations of electrical vehicle?

SECTION – VI

11. (a)   What are the functions of storage battery used in an automotive vehicle?

        (b)   With a neat sketch explain the working of a lead-acid battery.

12   (a)   Draw simplified wiring circuit for the lighting system of a car and discusses them.

        (b)   What are essential accessories used in an automotive vehicle?

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

TOOL DESIGN
(Mechanical Engineering)

Time: 3 hours   Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) Consider the various forces acting on the chip, draw merchant force diagram. State the assumption made.

   (b) What are the different types of chips formed in metal cutting and explain nomenclature of single point cutting tool?

2 (a) Explain the ideal properties of cutting tool material.

   (b) During the machining of mild steel with a 0^0-10^0-6^0-6^0-8^0-90^0 -1mm triple carbide tool, the following observations have been made: depth of cut = 2m, feed = 0.25mm/rev, cutting speed 200m/min, chip thickness = 0.39mm, tangential force= 320N and axial force =170N. Determine i) shear force ii) Kinetic coefficient of friction iii) specific cutting energy.

SECTION – II

3 (a) Explain tool wear mechanism and types of tool wear.

   (b) During a turning operation the following tool life equation was found to be operative: $VT^{0.13}f^{0.77}d^{0.37} = C$. A 60min tool life was obtained while cutting at V= 30m/min, f=0.3mm/rev and d=02.5mm. Evaluate the change in tool life if the cutting speed, feed and depth of cut are increased by 20% individually.

4 (a) Discuss about the factors to be considered in selecting a cutting fluid.

   (b) What is the importance of measuring cutting forces? Explain the working of any one lathe tool dynamometer.

SECTION – III

5   Explain the properties desired for cutting tool materials. Explain the features of HSS as cutting tool material.

6 (a) Write a note on the specifications for tool inserts and tool holders.

   (b) Explain CBN and Diamond properties, Limitations and advantages.

SECTION – IV

7 (a) What are the limitations imposed on implementing optimum cutting variables calculated?

   (b) Obtain expression for cutting velocity which gives maximum production rate in turning process.

8   (a)   Discuss about design of shanks for single point cutting tool.

      (b)   What are the elements of a pull broach? Explain how each of the element's dimensions are arrived at.

SECTION – V

9   (a)   Illustrate with neat sketches the shear action in die cutting operations.

      (b)   It is required to punch a hole in the shape of equilateral triangle, side 30mm in a sheet of metal of thickness 1.8mm. Material yield strength 100kg/mm^2. Where the force should be applied? Is it same as the centroid of area?

10   (a)   Discuss the important variables that affect metal flow during drawing operation in brief.

      (b)   What is a double action draw die? Describe a double action draw die with a neat sketch.

SECTION – VI

11   (a)   What is meant by locating surface? Explain the 3-2-1 location with neat sketch.

      (b)   With the help of neat sketch explain the various clamping device in use.

12   (a)   Define jig. Differentiate between a jig and a fixture. Name the essential elements which make up a jig.

      (b)   List out the various types of jigs. Describe any two of them with suitable sketches.

B.TECH. DEGREE EXAMINATION, DECEMBER 2023

IV B.Tech. I Semester

TOOL DESIGN

(Mechanical Engineering)

Time: 3 hours   Max. Marks :60

*Answer **Six** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Consider the various forces acting on the chip, draw merchant force diagram. State the assumption made.

   (b)   What are the different types of chips formed in metal cutting and explain nomenclature of single point cutting tool?

2   (a)   Explain the ideal properties of cutting tool material.

   (b)   During the machining of mild steel with a 0^0-10^0-6^0-6^0-8^0-90^0 -1mm triple carbide tool, the following observations have been made: depth of cut = 2m, feed = 0.25mm/rev, cutting speed 200m/min, chip thickness = 0.39mm, tangential force= 320N and axial force =170N. Determine i) shear force ii) Kinetic coefficient of friction iii) specific cutting energy.

SECTION – II

3   (a)   Explain tool wear mechanism and types of tool wear.

   (b)   During a turning operation the following tool life equation was found to be operative: $VT^{0.13}f^{0.77}d^{0.37}$ = C. A 60min tool life was obtained while cutting at V= 30m/min, f=0.3mm/rev and d=02.5mm. Evaluate the change in tool life if the cutting speed, feed and depth of cut are increased by 20% individually.

4   (a)   Discuss about the factors to be considered in selecting a cutting fluid.

   (b)   What is the importance of measuring cutting forces? Explain the working of any one lathe tool dynamometer.

SECTION – III

5   Explain the properties desired for cutting tool materials. Explain the features of HSS as cutting tool material.

6   (a)   Write a note on the specifications for tool inserts and tool holders.

   (b)   Explain CBN and Diamond properties, Limitations and advantages.

SECTION – IV

7   (a)   What are the limitations imposed on implementing optimum cutting variables calculated?

   (b)   Obtain expression for cutting velocity which gives maximum production rate in turning process.

8 (a) Discuss about design of shanks for single point cutting tool.

   (b) What are the elements of a pull broach? Explain how each of the element's dimensions are arrived at.

SECTION – V

9 (a) Illustrate with neat sketches the shear action in die cutting operations.

   (b) It is required to punch a hole in the shape of equilateral triangle, side 30mm in a sheet of metal of thickness 1.8mm. Material yield strength $100kg/mm^2$. Where the force should be applied? Is it same as the centroid of area?

10 (a) Discuss the important variables that affect metal flow during drawing operation in brief.

    (b) What is a double action draw die? Describe a double action draw die with a neat sketch.

SECTION – VI

11 (a) What is meant by locating surface? Explain the 3-2-1 location with neat sketch.

    (b) With the help of neat sketch explain the various clamping device in use.

12 (a) Define jig. Differentiate between a jig and a fixture. Name the essential elements which make up a jig.

    (b) List out the various types of jigs. Describe any two of them with suitable sketches.

R-20

Code : 20CS41E3

SECTION - I

1 (a) Write short notes on Indexing and Slicing.

   (b) What are fundamental differences in functionality between Python lists and NumPy arrays?

2 (a) What are the More Useful Array Operations?

   (b) How to Create Basic Arrays?

SECTION - II

3 (a) Describe Transporting and Reshaping Matrices.

   (b) How to Accessing the Docstring for more information?

4 (a) Illustrate Working with Mathematical Formulas.

   (b) How to save and load NumPy Objects in detail?

SECTION - III

5 What are the operations are involved in Pandas?

6 (a) Discuss Time Series, Categorical data with examples.

   (b) Describe the following:
        i) Viewing Data, ii) Missing Data

SECTION - IV

7 Discuss about   i) Creating a plot and figure, ii) Axes, iii) Subplots in detail.

8 Demonstrate customizing plots with examples.

SECTION - V

9 Implement the Statistical Learning with an example.

10 (a) Illustrate about Machine Learning and Predicting in detail.

    (b) Explain Model Persistence with example.

SECTION - VI

11 Describe Building Specific Distributions

12 Write a Short note on Compressed Sparse Graph Routines.

RA   **Code : 20EE32E4**

B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech I Semester
POWER SEMICONDUCTOR DRIVES
(Electrical & Electronics Engineering)

Time : 3 hours   Max Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All questions carry equal marks
* * *

SECTION - I

1 (a) What is electric drive? Draw the block diagram of electric drive and explain its various parts.

   (b) What are the advantages of Electric drives?

2 (a) How do you define the active and passive load torques? Write their major differences

   (b) Discuss applications and choice of Electric drives.

SECTION - II

3 Explain the continuous conduction mode of separately excited DC motor fed by 1-ph full converter. Derive the speed-torque relation.

4 (a) Give reasons why 1-phase semi converter often not used for drive applications?

   (b) Explain briefly the following methods of braking of a D.C Motor (a) Regenerative braking (b) Dynamic braking (c) Plugging.

SECTION - III

5 Describe the operation of 3-ph semi converter fed DC motor and draw its speed torque characteristics.

6 Explain the two quadrant chopper controlled DC series motor and draw voltage, current waveforms. Discuss speed torque characteristics.

SECTION - IV

7 Draw and explain the torque speed characteristics of a three-phase Induction motor. Explain the induction motor operation when the *V/f* ratio is held constant. Also derive the expression for maximum torque

8 Discuss the speed control of Induction Motor using AC voltage controllers.

SECTION - V

9 What is slip power recovery? Explain the principle of operation of static Kramer drive.

10 Draw and explain the slip power recovery. Discuss the performance and speed-torque characteristics and advantages of Static Scherbius drive.

SECTION - VI

11 With suitable circuit diagrams discuss the principle of operation of self-controlled synchronous motor drive.

12 (a) Discuss the applications of synchronous motor drives.

   (b) Explain the working of CSI fed Synchronous motor drive with neat circuit diagram.

R-20   **Code : 20AD41E8**
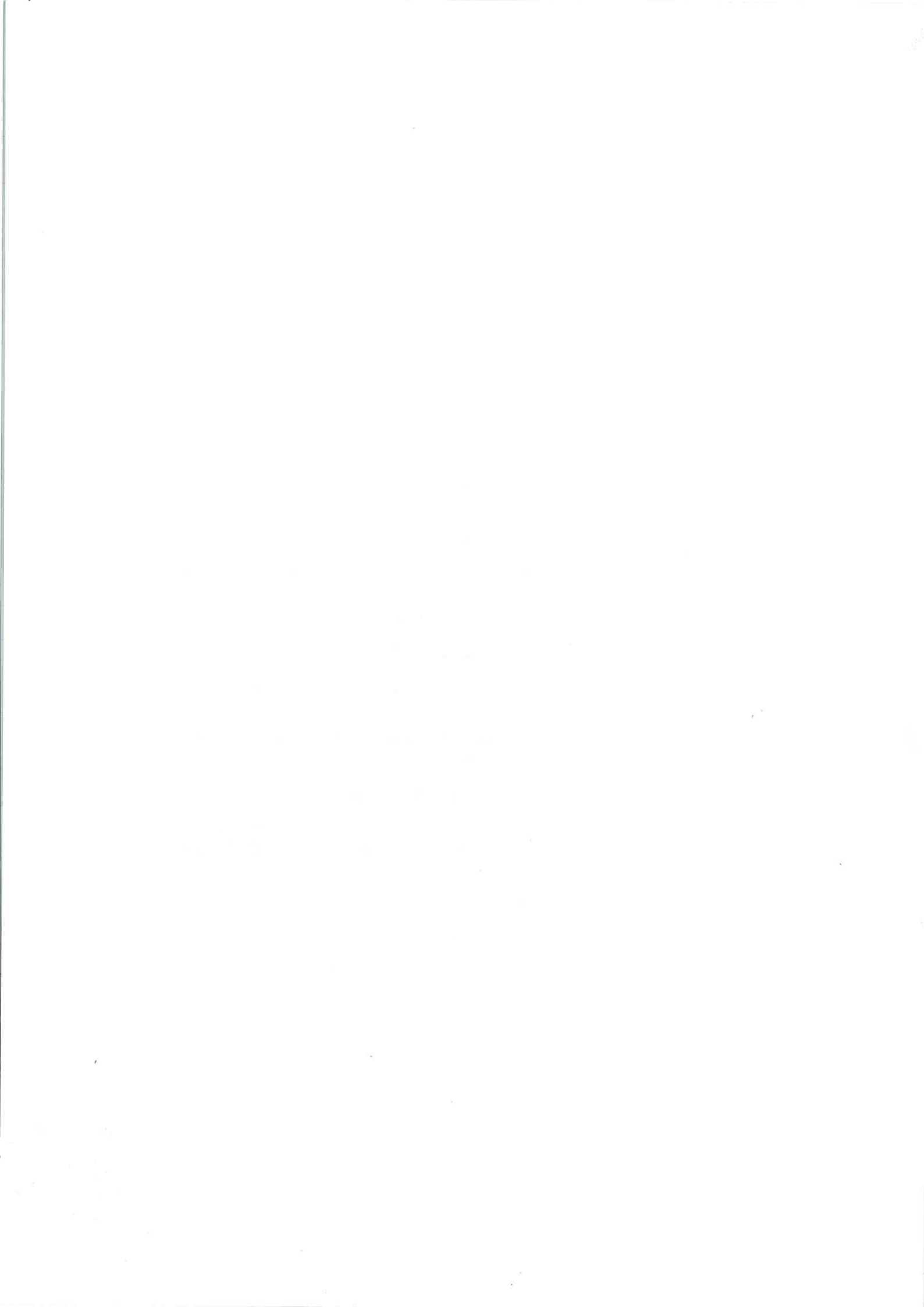
B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech. I Semester
REINFORCEMENT LEARNING
(Common to CSE, IT & AI&DS)

Time : 3 hours   Max. Marks :60

*Answer **Six** Questions, Choosing ONE Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Define Reinforcement Learning. Describe the key elements of reinforcement learning.

    (b)   Illustrate Tic-Tac-Toe problem with the idea of reinforcement learning.

2   (a)   Outline the limitations and scope of reinforcement learning.

    (b)   Discuss the real-time applications of reinforcement learning.

SECTION - II

3   (a)   What is incremental implementation in the context of multi-arm bandits?

    (b)   How does an agent track a Non-stationary problem in a multi-arm bandit scenario?

4   (a)   Explain the concept of Gradient Bandits and how it selects action?

    (b)   How does Upper-Confidence-Bound Action selection balance exploration and exploitation?

SECTION - III

5   (a)   What is the concept of returns in the context of finite Markov decision processes?

    (b)   What is the Markov property in the context of finite Markov decision processes?

6   (a)   What are the optimal value functions in the contest of finite Markov decision processes?

    (b)   How id optimality defined in finite Markov decision processes?

SECTION - IV

7   (a)   How does policy improvement work in dynamic programming?

    (b)   What is value iteration and how does it differ from policy iteration?

8   (a)   Explain the efficiency of dynamic programming algorithms.

    (b)   Provide an example of how dynamic programming is used in a real world problem?

SECTION - V

9 (a) What is off-policy prediction via importance sampling in Monte Carlo methods?

   (b) How do Monte Carlo methods handle exploration and exploitation in reinforcement learning?

10 (a) Explain the update rule used in TD prediction methods and explain the update rule used in Sarsa.

   (b) How is the update rule different Q-learning compared to Sarsa?

SECTION - VI

11 (a) What is TD prediction? List its advantages.

   (b) Explain SARSA algorithm in an uncertain environment.

12 Explain Q-learning with an example.

R-20

SECTION - I

1 (a) Explain the global perspective on cybercrimes.

   (b) Write short notes on cybercrime.

2 (a) Describe the impact of security breach on an organization.

   (b) Explain the legal perspectives on Cybercrimes.

SECTION - II

3 (a) What are the various categories of cybercrimes?

   (b) Define and explain Attack Vector in detail.

4 (a) Demonstrate how criminals plan the attacks.

   (b) Describe different types of social engineering attacks.

SECTION - III

5 (a) Discuss about Key loggers and spywares.

   (b) Illustrate the concept of Spyware with real time examples.

6 (a) Demonstrate Virus with examples

   (b) Write short notes on Proxy Servers

SECTION - IV

7 (a) Discuss about historical background of cyber forensics.

   (b) What are the different types of digital evidence that can be crucial in a cyber-forensics investigation?

8 (a) Describe cyber forensics, and how does it contribute to digital investigations?

   (b) Explain the main components of a network forensics investigation process?

SECTION - V

9   (a)   How do you protect people's privacy in the organization?

     (b)   What is Social Computing? Discuss the associated challenges for organizations.

10   (a)   What are the most prevalent web threats that organizations face today?

     (b)   Explain the Social media marketing

SECTION - VI

11   (a)   Describe intellectual property in the cyberspace.

     (b)   What ethical considerations are involved in defining cybercrimes?

12   Write about the psychology, mindset and skills of hackers and other cyber criminals.

R-20   **Code : 20AD41E2**

B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech. I Semester
DATA SCIENCE
(Common to CSE & IT)

Time : 3 hours   Max. Marks :60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1 (a) Briefly explain How NumPy enhance the efficiency of data manipulation in Python.

(b) Explain the concept of universal functions in NumPy and their role in performing fast element-wise array functions.

2 Discuss the five steps of the data science process in detail. How do these steps contribute to the effective analysis of data.

SECTION - II

3 (a) How does Pandas facilitate the initial exploration of datasets, and what are the key steps involved?

(b) Discuss various operations that Pandas offers for data transformation, cleaning, and manipulation.

4 (a) How does Pandas handle tasks like calculating correlation, covariance, unique values, value counts, and membership in datasets?

(b) How can Pandas be used to connect to and interact with databases for data retrieval and analysis?

SECTION - III

5 (a) Describe the process of data transformation in the context of data cleaning and preparation.

(b) Discuss various strategies and techniques in Pandas for detecting and dealing with missing values in datasets.

6 (a) Explore the various string manipulation methods available in Pandas, with a focus on the String object methods.

(b) Describe how vectorized string functions can simplify and accelerate text data processing tasks.

SECTION - IV

7   (a) How does data wrangling help in preparing data for further analysis, and what are the key challenges it addresses?

     (b) Discuss the challenges and considerations when merging datasets with different structures and overlapping columns.

8   (a) Provide examples of how hierarchical indexing can be used to facilitate complex data manipulations.

     (b) Explain the concept of reshaping and pivoting data in the context of data wrangling.

SECTION - V

9   Provide an overview of the Matplotlib API, its key components, and the role it plays in data visualization. How does Matplotlib facilitate the creation of various types of plots for effective data representation?

10 (a) Explore the concept of data aggregation and its role in summarizing and condensing large datasets.

     (b) Describe the use of pivot tables and cross-tabulation in data analysis.

SECTION - VI

11 (a) Explain the fundamental concepts of time series data, including the elements of time series, and trends.

     (b) Explore the concept of date ranges, frequencies, and shifting in time series data.

12 (a) Discuss the resampling of time series data, covering down-sampling, up-sampling, and interpolation techniques.

     (b) Explore moving window functions and their role in time series analysis.

R-20

Code: 20CS41E2

B.TECH. DEGREE EXAMINATION, DECEMBER 2023
IV B.Tech. I Semester
MACHINE LEARNING APPLICATIONS
(Artificial Intelligence & Data Science)

Time: 3 hours

Max. Marks: 60

Answer Six Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION – I

1   (a)   Explain the Phases of the Machine Learning Life Cycle with an example.

    (b)   Define Machine Learning. Why you use Machine Learning? Justify your answer.

2   (a)   What are the classifications of Machine Learning algorithms explain with an example?

    (b)   Explain the steps involved to install the packages in Python? Explain with any 3 libraries.

SECTION – II

3   (a)   State and explain Decision tree learning algorithm with an example.

    (b)   Determine the K-nearest neighbor algorithm with an example.

4   Implement K-Nearest Neighbour algorithm using python frameworks? Explain with example.

SECTION – III

5   (a)   State and explain the Applications of Regression algorithms.

    (b)   Distinguish between Liner regression and Polynomial regression·

6   (a)   Explain K-Means Clustering algorithm with an example.

    (b)   State and explain Hidden Markov Model.

SECTION – IV

7   (a)   Explain Back Propagation algorithm with an example.

    (b)   What are the problems of Neural Networks explain with an example.

8   Implement Back Propagation Algorithm using Python Framework.

SECTION – V

9   (a)   What is Reinforcement Learning? Explain how it works with an example.

    (b)   State and explain the Real Time Applications of Reinforcement Learning .

10   Explain different models of Reinforcement Learning.

SECTION – VI

11   Implement Genetic Algorithm in Python Framework.

12   State and explain the real time applications of Genetic Programming.