B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

IV B.Tech. I Semester

PRODUCTION SYSTEMS
(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 continuous production. List out its characteristics.
  (b) What are the steps required for implementing JIT? Explain.

2   Illustrate production ordering KANBAN, with an example.

SECTION – II

3 (a) Discuss the various types of production.
  (b) What is productivity? Discuss the methods to improve productivity.

4 (a) What are the steps to be followed in process planning? Explain with a case study
  (b) How will you determine if an organization does or does not have a product development process in place?

SECTION – III

5 (a) What is plant location? Discuss the need for plant location. What are the steps involved in selecting a location?
  (b) Write any two differences between rectilinear minimum and rectilinear minimax

6 (a) What are the methods used in the evaluation of Plant location? Explain each in detail.
  (b) Write the basic difference between squared Euclidean and Euclidean distance location problems.

SECTION – IV

7   Explain the principles of the MRP system with a case study.

8   A factory needs 36000 units annually of a component that cost Rs.2 per unit. The cost of each rderplaced is Rs.25 and the inventory carrying cost is Rs.10 per year.

    (i) Find the economic lot size and the total inventory cost.
    (ii) What is the time between the placing of orders?
    (iii) The supplier offers 2% discount if a single order is placed. Should the company accept it?

SECTION – V

9 .   What is aggregate planning? Explain the pure strategies of aggregate planning.

10 .   What is value analysis? Explain in detail with a case study.

11   Consider the following problem involving activities from A to J.

Activity	Immediate predecessor(s)	Duration (months)
A	-	1
B	A	4
C	A	2
D	A	2
E	D	3
F	D	3
G	E	2
H	F,G	1
I	C,H	3
J	B	2

i) Construct the CPM network. ii) Determine the critical path. iii) Compute total floats and free floats for non-critical activities.

12   A project PERT network has only three possible paths, P-R, P-S-U, and Q-T-U. The activities, along with their expected time and standard deviations, are represented in ordered pairs as P(8, 2), Q(16, 4), R(15, 3), S(14, 2), T(5, 2), and U(5, 1). Develop the network and find the probability of completing the project in 25 days.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023
IV B.Tech. I Semester

DATA BASE MANAGEMENT SYSTEM
(Common to CE,EEE & ECE)

Time : 3 hours   Max. Marks :60

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

SECTION – I

1   (a)   Summarize the levels of Data Abstraction of Database Systems
     (b)   Categorize the role of Integrity Constraints

2   (a)   "Databases change over time as information is inserted and deleted". Justify
     (b)   Generalize the Kinds of Database users

SECTION – II

3   (a)   Consider the relational database mentioned below ,where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries.

     Relational Database: Employee(person_name, street,city),
     works(person_name, company, name, salary),
     Company(company_name, city),
     manages(person_name, manager_name).

     1. Find the names of all employees who line in the same city and on the same street as do their managers.

     2.Find the names of all employees in this database who do not work for First Bank corporation

     3.Find the names of all employees who earn more than every employee of Small Bank Corporation

     (b)   List and explain a Relational Database using an aggregate functions

4   (a)   Consider the Relational database mentioned above. Give an expression in the relational algebra for each request.
            1. Modify the database so that Jones now lives in Newtown
            2. Give all managers in the database a 10 % salary raise

     (b)   Outline how the different relational operations deal with null values

SECTION – III

5   (a)   Summarize the Mapping cardinalities. Give a example.

     (b)   Importance of Weak Entity Sets. illustrate entity set
            Payment(payment_number,payment_date,payment_amount),loan(loan_number ,amount)

6   (a)   Define Entity and mention the major components of Entity-Relationship Diagrams.

    (b)   Summarize the concept Generalization .Give a example.

SECTION – IV

7   (a)   List and Illustrate the Set operation in SQL using sample data base.
    (b)   Importance of Join Types with example.

8   (a)   Summarize the view and its operations.
    (b)   Write short notes on Internet control Message Protocol.

SECTION – V

9   (a)   List all functional dependencies satisfied by the relation

A	B	C
a1	b1	c1
a1	b1	c2
a2	b1	c1
a2	b1	c 3

    (b)   Illustrate the importance of BCNF with known database.

10 (a)   Define Decomposition and explain its types
    (b)   Define Multivalued dependency and its use in Fourth Normalform.

SECTION – VI

11 (a)   Discuss the mechanism of Two-phase locking protocol.
    (b)   List out the issues addressed in designing a remote backup System.

12 (a)   Build and explain the Timestamp-ordering Protocol Operation.
    (b)   Judge how Checkpoints are useful to reduce overhead in recovery process.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

IV B.Tech. I Semester

PYTHON PROGRAMMING
(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)   What is meant by function? Write a program to find the factorial of a number by creating a function "fact()"

    (b)   Compare and contrast between list and tuples with examples.

2   Explain about various number data types with examples.

SECTION - II

3   Explain about formatting string with example.

4   (a)   Write about verbose regular expressions.

    (b)   Demonstrate Street Addresses case study.

SECTION - III

5   Discuss the following with an example :

          (i) A Fibonacci Generators   (ii) A Fibonacci iterators.

6   Briefly explain about regular expressions in Python with examples.

SECTION - IV

7   Illustrate reading from text files.

8   Discuss the following with an example :

          (i) Stream objects from non –linear file sources   (ii) binary files

SECTION - V

9   Explain about the following

          (i) Parsing XML   (ii) Generating XML

10   Write about the following in detail :

          (i) Saving data to pickle file   (ii) Saving data to a JSON file

SECTION - VI

11 (a)   Discuss in detail creating a graphical installer.

    (b)   Write about adding your software to the python package index

12   Explain

          (i) How to write your setup script   (ii) How to check your setup script for errors.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023
IV B.Tech. I Semester

INDUSTRIAL ROBOTICS
(Common to ME,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   Write in detail about the following with neat sketches
    (a) Spatial resolution   (b) Accuracy
    (c) Repeatability   (d) Work Volume

2   (a)   What is precision of movement of a robot? Explain the terms spatial resolution, accuracy, and repeatability.

    (b)   Describe work volume and load carrying capacity with reference to robot .

SECTION - II

3   (a)   Enumerate the relative merits and demerits of various drive systems used in industrial robots.
    (b)   Classify velocity sensors. Illustrate any one of the sensors.

4   (a)   State the purpose of sensor, enumerate different characteristics of sensors, and classify sensors.
    (b)   Does complexity in designing a robot depend on types of actuators and number of sensors used? If so, Justify.

SECTION - III

5   (a)   Differentiate servo and Non-servo robots.

    (b)   Define the path and trajectory.

6   (a)   The velocity profile of a trajectory is trapezoidal with constant acceleration segment for 0.5 sec duration and constant velocity of 10^0/sec. determine the parameters of the smooth trajectory for interpolating the time sequence of position with this type of trajectory.

    (b)   Enumerate the Joint space trajectory using cubic polynomial.

SECTION - IV

7   (a)   Define rotation matrix, state its properties. Explain the geometric interpretation of the rotation matrix.
    (b)   Determine the rotation matrix about x axis. Compute inverse of the matrix.

8   (a)   Derive forward and kinematic equation for 2R robot.

     (b)   Write in detail about robot dynamics.

SECTION - V

9   (a)   What is the importance of robot programming?

     (b)   Write a programme to move the end effector linearly with respect to its base.

10   (a)   Explain about the following commands used in Rapid programming language MoveL, MoveJ, MoveC and MoveAbs.

     (b)   Brief out textual programming languages.

SECTION - VI

11   (a)   What are the capabilities and features of Robots in spot welding? Explain.

     (b)   Discuss the applications of robots used in the field of Material Handling.

12   (a)   Illustrate any two types of robotic work cells.

     (b)   Justify economical benefits with use of the robots in industry.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023
IV B.Tech. I Semester
BRIDGE ENGINEERING
(Civil Engineering)

Time : 3 hours   Max. Marks :60

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

Use of IRC:6-2014, IRC:112-2011, IRC:24-2001, IRC:22-2015, IS:800-2007, IS:456-2000
code books and steel tables are Permitted.
Assume any data, if required.

SECTION - I

1   Explain Briefly different components of a bridge and loads to be considered for designing those components.

2   Discuss about Economical span of a bridge along with mathematical expressions.

SECTION - II

3   Design a reinforced concrete box culvert having a clear vent way of 3m x 3m.The superimposed dead load on the culvert is 12.8 kN/m^2. The live load is estimated as 50 kN/m^2. Density of soil at site is 18 kN/m^3. Angle of repose is 300. Adopt M20 grade concrete and Fe415 steel. Sketch the details of reinforcement in the box culvert. The design shld conform to the specifications IRC: 112 -2011.

4   Design the reinforced concrete slab deck and sketch the details of reinforcement in the longitudinal and cross section of the slab for a reinforced concrete box culvert for a national highway crossing to suit the following data.
Carriage way - Two lane (7.5 m wide)
Foot paths - 1 m on either side
Clear span = 6 m
Wearing coat thickness = 80 mm
Width of bearing = 400 mm
Materials - M25 grade concrete and Fe415 HYSD bars
Loading – IRC class AA tracked vehicle.

SECTION - III

5   Explain how Pigeaud's Method and Courbon method are used for the design of slab and girder bridges.

6   Design the reinforced concrete slab deck for a T- beam bridge using Pigeaud's method for the following data.
Clear width of roadway = 7.5 m
Width of kerbs = 600 mm
Effective span = 20 m
Live load = IRC class AA tracked vehicle
Thickness of wearing coat = 80 mm
Number of main girders = 4
Materials = M$_{20}$ grade concrete and Fe$_{415}$ grade steel
Spacing of cross girders = 4 m
Spacing of main girders = 2.5 m
Sketch the reinforcement details of deck slab along with the cross section of bridge.

SECTION - IV

7   Explain the step by step procedure for the design of plate girder bridge.

8   Design the shear connectors for the composite bridge as shown in the figure below. The maximum shear force is 40 kN
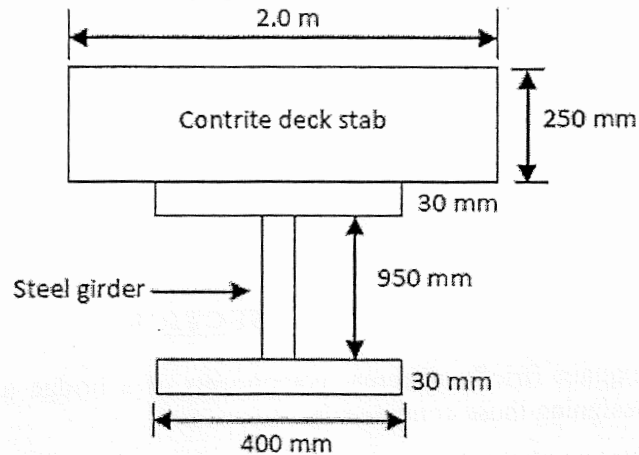
SECTION - V

9   (a)   Describe different types of bridge piers.
      (b)   What are the functions of approach slab.

10   List out the forces acting on an abutment. Sketch the typical cross section of abutment and indicate the forces acting on the abutment.

SECTION - VI

11   Design a steel rocker bearing for transmitting a vertical reaction of 1000 kN and a horizontal reaction of 100 kN at the support of a bridge girder, assuming the following permissible stresses.
Permissible compressive stress in concrete block = 4 N/mm^2
Permissible bending stress in steel plate = 160 N/mm^2
Permissible bearing stress in steel plate = 185 N/mm^2
Permissible shear stress in steel = 105 N/mm^2
Sketch the typical details of the rocker bearing.

12   Explain with the help of neat sketches Rocker bearing and Elastomeric bearing.

R-17   **Code: 17EC41E1**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023
IV B.Tech. I Semester
OPTICAL 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)   Draw the structure and refractive index profile of Step index fiber.

    (b)   Estimate the Critical angle, NA and Acceptance angle of the fiber at the Core Refractive index profile 1.50 and Cladding refractive index profile 1.48

2   (a)   Write the advantages of optical fiber communication system.

    (b)   In a single mode step index fiber having refractive index of core and cladding 0.8, 0.6 and find out number of modes and normalized frequency value?

SECTION - II

3   (a)   Elaborate the linear and nonlinear scattering losses in optical fibers.

    (b)   Discuss and derive the expression for overall fiber dispersion.

4   (a)   Explain different types of fiber joints.

    (b)   Write short notes on fiber couplers.

SECTION - III

5   (a)   Interpret direct and indirect band gap materials used in light sources with diagrams.

    (b)   Derive the relationship between internal quantum efficiency and internal power.

6   (a)   Relate the internally generated power of an LED with the drive current and derive the same.

    (b)   Compare LED and LASER light sources.

SECTION - IV

7   (a)   Explain the functionality and operation of receiver.

    (b)   How to caliculate a probability of error in receiver?

8   (a)   Caliculate the average photo current of a photo detector for an incident power of 1 W at a wavelength of 1550 nm.

    (b)   Explain the response time and bandwidth of photo diode with derivations.

SECTION - V

9   (a)   Discusses about operation of Erbium –Doped fiber Amplifier with diagram.

    (b)   Write about operational principles of WDM.

10 (a) Generalize the operation of Raman amplifier.

(b) List out the features of WDM and discuss them in detail.

SECTION - VI

11 (a) Outline the measurement of dispersion in optical fibers.

(b) Describe with neat diagram about Fiber cut- off Wavelength Measurement.

12 (a) Develop a procedure to measure the Numerical Aperture of the fiber.

(b) Identify the applications of optical fibers in telephony and telemetry.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

IV B.Tech. I Semester

MANAGEMENT SCIENCE
(Common to EEE, ECE, 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) Classify the five functions of management with suitable example.

   (b) "Two factor theory is superior to need theory" do you agree? In this context discuss two factor theory in a brief.

2 (a) Examine Henry Fayol 14 principles of management.

   (b) Discuss Douglas McGregor's Theory X and Theory Y .

SECTION - II

3 (a) Discuss the matrix organization in detail.

   (b) Discuss the social responsibilities of business.

4 (a) Compare virtual organization and team organization.

   (b) Examine the principles of organization.

SECTION - III

5 (a) Examine the steps in strategy formulation and implementation.

   (b) What is SWOT analysis? What is the significance of SWOT analysis for strengthening an organization?

6 (a) Examine the functions of marketing.

   (b) Discuss marketing strategies adopted in product life cycle stages.

SECTION - IV

7 (a) Define training . Explain the types of the job training methods.

   (b) What is selection? Explain the procedure followed in selection process.

8 (a) Examine different methods of merit rating.

   (b) Discuss different incentive plans adopted to motivate employees in organization.

SECTION - V

9 (a) Examine the factors affecting the location of plant.

   (b) Discuss process layout with advantages and limitations.

10 (a) Discuss the steps involved in work measurement.

    (b) Distinguish between job production and batch production.

11   A Small project is composed of 7 activities whose time estimates are listed below.

Activity	Estimated time duration		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

Draw PERT diagram and represent the project completion time.

12 (a) Distinguish between PERT and CPM .

(b) Discuss the rules of drawing network.

R-17   **Code : 17SH4101**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

IV B.Tech. I Semester

ECONOMICS & ACCOUNTANCY
(Common to ME & CE)

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 Economics and explain the scope of economics and its relation with other subjects.

     (b)   Define the law of demand. What are the reasons for downward sloping of demand curve?

2   (a)   Define Elasticity of demand. Explain its types and significance.

     (b)   Explain the law of diminishing marginal utility analysis with reasonable example.

SECTION - II

3   (a)   Explain the salient features of Cobb- Douglas production function.

     (b)   Explain the salient features and limitations of Break-even analysis.

4   (a)   Explain the importance of costs and cost concepts in the production.

     (b)   Define production function. Explain production function with one variable input.

SECTION - III

5   (a)   What do you mean by market? Explain classifications of markets.

     (b)   Illustrate the price determination under perfect competition.

6   (a)   Explain the features of perfect competition market.

     (b)   Explain the features of monopoly market and monopolistic market.

SECTION - IV

7   (a)   Explain the functions of commercial banks in India.

     (b)   What is Debenture? State the difference between share and debenture.

8 (a) Differentiate sole trader and partnership form of business organization.

   (b) What is partnership? Explain the types of partners.

SECTION - V

9 (a) Define accounting and what do you understand by accounting concepts? What are they?

   (b) Write a Short note on
        i)   Journal
        ii) Ledger
        iii) Trail Balance

10 (a) Define Accounting. Explain the principle of accounting.

    (b) Journalise the following transactions in the books of ABC firm

         2003 January   1 ABC firm commenced business with Rs 40,000/-
                         2 Deposited into bank Rs 30,000/-
                         3 Bought goods worth Rs 48,000/- from Kamal
                         4 Sold goods worth Rs 60,000/-
                         5 paid rent Rs 4,000/-; advertising Rs 3,000/-
                         6 Sold goods worth Rs 50,000/- to Suresh
                         7 Suresh pays Rs 48,600/- in full settlement of account
                        10 Paid Rs 40,000/- to Kamal on account

SECTION - VI

11 (a) What is working capital? Briefly explain the different techniques of capital budgeting.

    (b) What factors should a finance manager take into consideration while estimating capital?

12 (a) Compare features merits and demerits of f capital budgeting techniques.

    (b) Explain the factors affecting on working capital management.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

IV B.Tech. I Semester

CONCRETE TECHNOLOGY
(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) What are Bouge's compounds? Explain in detail how each one of these compounds influences the strength and setting properties of cement.
  (b) Enumerate types of cement and explain any two with uses.

2 (a) Explain the advantages of using plasticizers and super plasticizers in concrete making.
  (b) Briefly explain different types of cement.

SECTION - II

3 (a) Write about alkali aggregate reaction.
  (b) List the deleterious substance in aggregates and explain their influence on concrete

4 (a) Explain the significance of grading of aggregates with reference to concrete making.
  (b) Explain different methods of measurement of moisture content of aggregates.

SECTION - III

5 (a) What are the factors affecting the workability of concrete?
  (b) How is the compacting factor measured?

6 (a) Explain the effect of time and temperature on workability of concrete.
  (b) What are the special features of transportation of ready mixed concrete from the plant to the site?

SECTION - IV

7 (a) Explain in detail the factors influencing the strength results in case of hardened concrete.
  (b) Write a brief note on Flexure strength of Concrete.

8 (a) Calculate the Gel/space ratio and the theoretical strength of a sample of concrete made with 500g of cement and 0.6w/c ratio, on i) Full hydration ii) 70% hydration
  (b) Explain about ultra-pulse velocity test to determine the quality of concrete.

SECTION - V

9 (a) Describe the role of aggregate in creep of concrete.
  (b) Discuss the influence of mix proportions of concrete on shrinkage.

10 (a) Explain relation between Modulus of elasticity and strength.
    (b) Explain durability of concrete and list out factors affecting durability of concrete.

SECTION - VI

11 (a) What is the need to study fiber reinforced concrete and explain briefly the factors effecting properties of fiber reinforced concrete?
    (b) Explain in detail the various steps involved in designing concrete mixes using I.S.I method.

12   Design a concrete mix of M20 grade for a roof slab. Take a Standard deviation of 4MPa. The specific gravities of Coarse Aggregate and Fine Aggregate are 2.73 and 2.60 respectively. The bulk density of coarse aggregate is 1615kg/m3 and fineness modulus of fine aggregate is 2.74. A slump of 55mm is necessary. The water absorption of coarse aggregate is 1% and free moisture in fine aggregate is 2%. Design the concrete mix using IS code method. Assume any missing data suitably

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023
IV B.Tech. I Semester
POWER SYSTEM OPERATION AND CONTROL
(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 an incremental fuel cost? How is it used in thermal plat operation?

      (b)   Explain how the incremental production cost of a thermal power station can be determined.

2   Explain the following terms with reference to power plants: heat input-power output curve, heat rate input, incremental input, generation cost and production cost.

SECTION - II

3   Obtain the condition for optimum operation of a power system with 'n' plantsincluding the effect of transmission losses.

4   A power system consists of two 200MW units whose input cost data are represented by the equations: $C_1 = 0.03P_1^2 + 21P_1 + 750$ Rs./hour, $C_2 = 0.5P_1^2 + 18P_1 + 980$ Rs./hour. If the total received power $P_R = 350$ MW, determine the load division between the units for the most economic operation.

SECTION - III

5   Explain the problem of scheduling hydrothermal power plants. Explain the constraints in the problem.

6   Explain priority list method for unit commitment problem with an example.

SECTION - IV

7   What is automatic voltage regulator? Obtain the mathematical modeling of generator.

8   Show that real power flow between two nodes is determined by the transmission angle δ and the reactive power flow is determined by the scalar voltage difference between the nodes.

SECTION - V

9   Explain with block diagram, the modeling of (a) Speed governing system (b) Generator and load

10   Obtain the complete block diagram representation of ALFC of an isolated power system, with necessary transfer functions.
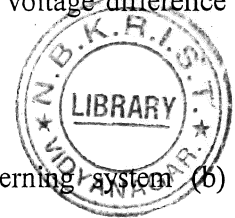
SECTION - VI

11   What is SCADA system? Draw the block diagram and explain the digital computer configuration of the SCADA system.

12   Enumerate the various system operating states.

B.TECH. DEGREE SUPPELMENTARY EXAMINATION, FEBRUARY 2023
IV B.Tech. I Semester
CAD / CAM
(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) Explain the CAD/CAM process of the product cycle with neat sketch.
   (b) Bring out clearly the difficulties a design engineer has to face at each of the design stages if they are carried out manually.

2 Explain 2-D scaling, rotation, reflection and translation with suitable example.

SECTION - II

3 Define Geometric Modeling. Write about three principal classifications of the geometric modeling system in detail.

4 Define Geometric model. Explain how a 3-D object is represented by a wire frame model.

SECTION – III

5 Explain in detail about surface modeling and their representation.

6 Differentiate between C-Rep and B-Rep solid representations schemes with reference to mathematical modeling, storage, applications and limitations.

SECTION - IV

7 Distinguish between Numerical Control and Computer Numerical Control.

8 Explain briefly about computer assisted part programming with an example.

SECTION - V

9 Explain Opitz classification and coding system in GT.

10 (a) What are the functions performed by FMS computer control system.
    (b) Discuss the differences between Retrieval CAPP system and Generative CAPP System.

SECTION - VI

11 Discuss in detail about scanning laser system used for non-contact inspection method.

12 Discuss principles of material handling. Name and describe the five types of material handling devices.
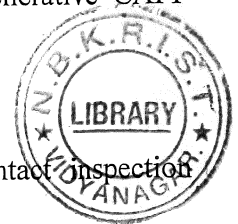
B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

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) Explain the fundamental steps involved in Digital Image Processing with a neat block diagram.
   (b) Illustrate the structure of human eye.

2 Elaborate the principle of sampling and quantization. Discuss its effect on increasing
   (i) sampling frequency (ii) quantization levels of image.

SECTION – II

3 (a) Examine Haar Transform for following N Value. N=6.
   (b) Describe about Slant transform.

4 Compare 2D DFT and DCT of the gray scale image,

$$f(m, n) = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \end{bmatrix}$$

SECTION – III

5 Explain the different spatial filtering techniques used in images. Distinguish them with appropriate masks.

6 (a) Develop an expression for image sharpening using Laplacian filter.
   (b) How many types of gray level transformations are used for image enhancement? Brief it.

SECTION - IV

7 Explain the image restoration model in detail with example.

8 Develop the expression for observed image when the degradation is linear, position invariant.

SECTION – V

9 Explain any DCT based image compression scheme. Compare the same with Wavelet based image compression method.

10 Construct arithmetic coding to encode and decode the word "INDIA".

SECTION – VI

11 What is False color image processing? Explain the process in detail with neat diagram.

12 (a) How an RGB model is represented using HSI format? Describe the transformation.
    (b) Describe the steps involved for colour image filtering.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

IV B.Tech. I Semester

R PROGRAMMING
(Computer Science & 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) Write R Program to create a two – dimensional 5x3 array of sequence of even integers?

   (b) Explain all Decision making statements in R programming.

2   Give detailed explanation about Lapply, Sapply , Vapply and Tapply Functions with R code

SECTION - II

3 (a) Write a brief description about standard command packages in R

   (b) Write a procedure for how to install Extra Packages for windows users.

4 (a) Explain and how to Get Extra Packages of R Commands?

   (b) What is a package and explain how this packages concept helpful for R Programming?

SECTION - III

5 (a) Create a student dataset with roll no, name, cgpa phone number & city attributes using any command.

   (b) Write about using the clipboard to make Data and Reading a file of data from a disk.

6   Explain about scan and Combine command with suitable example for each.

SECTION - IV

7 (a) Create two data frames and merge them in a sorted order with suitable example.

   (b) Write an R program for addition of two matrixes .

8 (a) How to Convert a Matrix to a Data Frame ? Explain with suitable example.

   (b) How to Convert a Data Frame in to List ? Explain with suitable example.

SECTION - V

9 (a) Explain about Two –sample U –Test , One sample U-Test using Directional Hypotheses with example.

   (b) Write a short note on Simple Hypotheses Testing.

10 (a) Explain the process of Sub setting Sample in the T –Test with example.

   (b) Write a short note on Simple Correlation and Covariance.

SECTION - VI

11 (a) Write a short note on Box – Whisker plot with all parameters.

   (b) Construct a box plot for the following data 12,5,22,30,7,36,14,42,15,53,25.

12 (a) What are the various way to add lines of Best – Fit to scatter plots and write R Code?

   (b) Explain (i) multiple correlation plots   (ii) Line charts (iii) Pie –charts

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023
IV B.Tech. I Semester
ENVIRONMENTAL ENGINEERING - II
(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) Explain the systems of sanitation with merits and demerits.
   (b) Determine the maximum quantity of combined sewage based on the following data
        Population   : 150000
        Area to be served   : 200 hectares
        Average Impermeability factor : 0.4
        Time of entry-5 minutes and Time of flow-20 minutes

2 (a) Explain the hydraulic design of sewers.
   (b) What are the various sewer appurtenances? Describe in detail about manhole.

SECTION - II

3 (a) Discuss in brief physical characteristics of sewage.
   (b) The 2 day BOD of sewage is 200 mg/lit at 30°C. Determine the 5 day BOD at 20°C. Assume K_D at 20°C as 0.1/day.

4 What is meant by population equivalent? An industry currently discharges sewage is 5 MLD with 5 day BOD of 40 ppm. If the contribution of 5 day BOD is 80 gm per capita per day, determine the population equivalent.

SECTION - III

5 (a) With neat sketch, discuss the layout and functions of waste water treatment units.
   (b) Write a brief notes on i) Screens and ii) Grit chamber

6 (a) Design a rectangular sedimentation tank to treat 12 MLD of sewage.
   (b) Explain the working principle and constructional details of High Trickling filter.

SECTION - IV

7 (a) Design a conventional activated sludge treatment plant based on following data.
        i) Sewage flow = 1 MLD   ii) MLSS = 2000 mg/lit
        ii) Inlet BOD = 150 mg/lit   iv)   F/M ratio = 0.2
   (b) Explain with neat sketch, the working principles of stabilization pond.

8 (a) What are various methods of sludge thickening? Describe any one in detail.
   (b) Explain the de-nitrification method for removal of nitrogen from sewage.

SECTION - V

9 (a) Define digestion. Differentiate between anaerobic and aerobic digestion. Explain the mechanism of anaerobic digestion.
   (b) Discuss in brief biological nitrification-denitrification for the removal of nitrogen from wastewater..

10   What is the difference between sludge thickening and sludge dewatering?

Detailed procedure of suspended solids removal from sewage.

SECTION – VI

11   (a)   Explain the conditions favorable for dilution method.

    (b)   What is meant by oxygen deficit? Explain its significance in purification of river water.

12   (a)   Design a septic tank for a colony 150 users with a water supply 120 lit/head/day.

    (b)   Describe the various methods of septic tank effluent disposal.

R-17　　　　　　　　　　　　　　　　　　　**Code : 17EE4102**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 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 are the different types of electrical drives and explain briefly?

 (b) What are the advantages of electric drives?

2 (a) Brief about the Block diagram of Electrical Drive with various parts.

 (b) Describe the function of power electronic converter in an Electric Drive.

SECTION - II

3 Derive Expressions for Braking methods of DC Separately Excited motor fed from a Single phase fully controlled Rectifier.

4 (a) Explain different types of electrical brakings and derive the expression for braking current.

 (b) A 200V, 1000 rpm 13A separately excited DC motor has armature circuit resistance and inductance of 3 ohm and 100mH. It is fed from a 1-ϕ half controlled rectifier with AC source voltage of 230V, 50Hz. Calculate

　i)Motor torque for $\alpha = 30°$ and speed 400 rpm

　ii) Motor speed for $\alpha = 30°$ and T = 70 N-m

SECTION - III

5 (a) Explain the basic operational aspects of three phase fully controlled converters with neat sketches of the waveforms and the circuit diagram.

 (b) Distinguish between circulating current and non-circulating current mode of operation.

6 Draw and explain in detail of motoring and regenerative braking operation of chopper control of separately excited DC motor.

SECTION - IV

7 (a) Draw the equivalent circuit of induction motor and derive the expression for torque.

 (b) Explain the speed control of induction motor by AC voltage controllers.

8 (a) Draw various configuration diagrams for variable voltage and variable control Induction motor drive.

 (b) What is frequency control of induction motor? Explain the operation of VSI fed induction motor drive.

SECTION - V

9   What are slip power recovery schemes?
Explain the operation of static Scherbius drive and derive the torque expression.

10   Explain the speed control of induction motor using staic kramers drive and draw its speed torque characteristics.

SECTION - VI

11   Explain the operation of load commutated CSI fed synchronous motor drive.

12   (a)   Explain with neat diagram about Load Commutated Inverter fed Synchronous motor speed control.

      (b)   Derive the torque expression for Synchronous motor.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023
IV B.Tech. I Semester
DIGITAL DESIGN WITH FPGA
(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) Draw the basic inverter circuit using emitter-coupled logic (ECL) and analyze the operation of the circuit with input as Logic High.

   (b) Construct the basic two input NOR gate using CMOS logic and analyze the operation of the circuit with functional table.

2 (a) Summarize the characteristics of TTL Families.

   (b) Construct the basic three input NAND gate using CMOS logic and analyze the operation of the circuit with functional table.

SECTION - II

3 (a) Memorize the syntax of a VHDL entity declaration and describe the elements present in it.

   (b) Demonstrate the concurrent signal assignment Dataflow style VHDL program for detection of prime number of a four input binary number.

4 (a) Outline the use of library in VHDL.

   (b) Describe the data flow design elements in VHDL.

SECTION - III

5 (a) Construct the circuit 4-to-16 decoder using 74X138.

   (b) Describe Three-State Driver circuit, illustrate various types in it and construct VHDL module for each type of device.

6 (a) Construct the structural VHDL program for a 74x280-like parity checker circuit.

   (b) Develop behavioral VHDL program for a 74x148-like 8-input priority encoder.

SECTION - IV

7 (a) Model the VHDL behavioral model of an edge-triggered D flip-flop.

   (b) Convert SR-Flip Flop to D-Flip Flop and model the same with VHDL structural program.

8   (a) Construct circuits for a T flip-flop with enable using a D flip-flop and J-K flip-flop.

    (b) Analyze the circuit design positive-edge-triggered D flip-flop with enable using function table and logic symbol.

SECTION - V

9   (a) Develop VHDL program for an 8-bit synchronous serial counter.

    (b) Using the 74x163 design a modulo-11 counter with the counting sequence 5, 6,......,15, 5, 6,.......

10 Construct the logic circuit for Parallel-to-serial conversion using a parallel-in shift register.

SECTION - VI

11 (a) Design an 8X4 diode ROM using 74X138 for the following data starting from the fist location 1,4,9,B,A,0,F,C

    (b) Memorize the ROM internal structure and analyze the device with help of read cycle timing diagram.

12 (a) Describe the Logic Block Architecture of FPGA.

    (b) Discuss different types of FPGA programming modes.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, FEBRUARY 2023

IV B.Tech. I Semester

REFRIGERATION & 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) What is the difference between direct and indirect refrigeration system? Explain the advantages of one over other.

   (b) List out the advantages of vapour refrigeration system over air refrigeration system.

2   A refrigerator working on Bell-Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10^0 C. Air coming out of compressor is cooled to 30^0 C before entering the expansion cylinder. Expansion and compression follow the law $p.v^{1.35}$ = constant. Determine C.O.P. of the system.

SECTION - II

3 (a) What are the essential properties of a good refrigerant?

   (b) Explain different type of compressors used in vapour compression refrigeration system.

4 (a). Discus the advantages and disadvantages of air cooled condensers over water cooled condensers.

   (b) How the cooling towers are classified? Explain any one.

SECTION – III

5 (a) Name three common methods of defrosting evaporator coils of commercial refrigerators.

   (b) Why capillary tube is preferred to other throttling device in domestic refrigerator.

6 (a) Explain the working of thermostatic expansion valve. Can it be used to control the temperature?

   (b) Differentiate between low-side float valve and high-side float valve.

SECTION – IV

7 (a) Define the terms i) Specific humidity ii) Absolute humidity iii) Relative humidity iv) Dew point temperature and v) degree of saturation.

   (b) Atmospheric air at a DBT of 16°c and 25%RH passes through a furnace and then through a humidifier in such a way that the final DBT is 30°c and 50%RH. Find the heat and moisture added to the air. Also determine the sensible heat factor of the process?

8 (a) Compare sensible heating and cooling.

    (b) In an air conditioning system, the inside and outside conditions are DBT 25°c ,RH 50% and DBT 40°c, WBT 27°c respectively. The room sensible heat factor is 0.8. 50% of the room air is rejected to atmosphere and an equal quantity of fresh air added before air enters the air conditioning apparatus. if the fresh air added is 100 m/min. Determine: a)Room sensible and latent heat load b)Sensible and latent heat load due to fresh air c)Humidity ratio and DBT of air entering air conditioning apparatus.

SECTION - V

9   (a) Distinguish between winter air conditioning and summer air conditioning.

    (b) Explain the difference between comfort air-conditioning and industrial air-conditioning.

10 (a) Draw a neat la-belled diagram and explain a year round air-conditioning system.

    (b) Discuss briefly on ventilation systems.

SECTION - VI

11 (a) Sketch and explain a cascade refrigeration system.

    (b) What do you understand by 'cryogenics'? Explain it.

12 (a) Explain briefly various industrial applications of air-conditioning system.

    (b) Describe the different type of water coolers.