Code No: **R231101**

R23

SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations December-2024
LINEAR ALGEBRA & CALCULUS
(Common to all branches)

Time: 3 hours | Max. Marks: 70

Question paper consists of Part A & Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.
*****

PART-A **(20 Marks)**

1 a) Find the rank of $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ [2]

b) The system of equations $AX = B$ possess how many solutions [2]

If $\rho(A) = 2, \rho(A:B) = 2$ and no of unknowns are 3.

c) Find the eigen values of $adjA$ if the Eigen values of A are 3,4,1. [2]

d) Define quadratic form and give an example [2]

e) Write the Taylor's series expansion for f(x) [2]

f) Test whether $f(x) = \frac{1}{x}$ is differentiable on [1,2] [2]

g) Find $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}$ $for\ f(x,y) = e^x cosy$ [2]

h) Find $\frac{du}{dt}$ where $u(x,y) = 2xy, x = t^2, y = 2sint$ [2]

i) Evaluate $\int_0^1 \int_{-1}^1 xdxdy$ [2]

j) Evaluate $\int_0^2 \int_0^1 \int_{-1}^1 zdzdydx$ [2]

PART-B **(50 Marks)**

Unit-I

2 a) Reduce the matrix A to normal form where $A = \begin{bmatrix} 3 & -2 & 0 & -1 \\ 0 & 2 & 2 & 1 \\ 1 & -2 & -3 & 2 \\ 0 & 1 & 2 & 1 \end{bmatrix}$ [5]

b) Using Gauss Seidel method solve the system of equations [5]

$20x + y - 2z = 17, 3x + 20y - z = -18, 2x - 3y + 20z = 25$

Code No: R231102 | R23 | SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations January-2025
ENGINEERING PHYSICS

(Common to CSE, IT, AI&DS, AI&ML, CSE(AI&DS),CSE(AI&ML),CSE(AI),CSE(CS) & CSE(DS))

Time: 3 hours | Max. Marks: 70

Question paper consists of Part A & Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.

*****

PART-A **(20 Marks)**

1	a)	Why is necessary to have coherent sources in order to produce an interference pattern?	[2]
	b)	Define diffraction grating.	[2]
	c)	Write the limitations of Bragg's law.	[2]
	d)	What is the coordination number in crystallography?	[2]
	e)	What is dielectric loss?	[2]
	f)	Draw the B-H plots for hard and soft magnetic materials.	[2]
	g)	Explain the concept of wave-particle duality.	[2]
	h)	Calculate the probability that an electron state with energy E is occupied for the case of $E=E_F$	[2]
	i)	What is the significance of the forbidden energy gap?	[2]
	j)	How is drift current related to diffusion current in semiconductor?	[2]

PART-B **(50 Marks)**

Unit-I

2	a)	Give the theory of Newton's rings and describe how the wavelength of an unknown light source can be determined with the help of these rings?	[5]
	b)	When unpolarized light passes from air to a transparent medium, under what condition does the reflected light get polarized? Explain.	[5]

(OR)

3	a)	Discuss the Fraunhoffer diffraction at a single slit and obtain the condition for minima and maxima.	[5]
	b)	How does Nicol prism act as an analyzer? Explain with a neat ray diagram.	[5]

Unit-II

4 a) Determine the atomic radius and packing factor for FCC lattices. [5]

b) What are the Miller indices? What are their important features? [5]

(OR)

5 a) State and explain Bragg's law. Calculate the maximum order of diffraction if X-rays of wavelength 0.819Å is incident on a crystal of lattice spacing 0.282nm. [5]

b) Deduce Laue's equation of diffraction of X-rays and obtain Bragg's diffraction condition from them? [5]

Unit-III

6 a) Describe ionic polarization in an ionic dielectric and obtain an expression for ionic polarizability? [5]

b) What is a local field in solids? Deduce Clausius-Mossotti equation? [5]

(OR)

7 a) Distinguish between the dia, para and ferro magnetic materials? [5]

b) Explain the B-H curve of ferromagnetic material based on Weiss domain theory. [5]

Unit-IV

8 a) State and explain Heisenberg's uncertainty principle with suitable examples. [5]

b) Obtain the eigen values of a particle in an infinite square potential well? [5]

(OR)

9 a) What is the density of energy states in metals? Derive an expression for density of energy states? [5]

b) Derive an expression for the electrical conductivity of a material using quantum free electron theory? [5]

Unit-V

10 a) Explain the dependence of Fermi energy on carrier concentration and temperature. [5]

b) What is the Hall effect? Derive an expression for Hall coefficient? [5]

(OR)

11 a) Derive an expression for electron concentration in an intrinsic semiconductor? [5]

b) Explain the concepts of drift and diffusion currents in a semiconductor. [5]

*****

Code No: **R231103** | **R23** | SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations December-2024
COMMUNICATIVE ENGLISH
(Common to all branches)

Time: 3 hours | Max. Marks: 70

Question paper consists of Part A & Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.
*****

PART-A

Answer the following questions. **(20 Marks)**

1 a) Why did the narrator meet Mr.Aziza? [2]

b) Describe briefly the hardships faced by Mrs.Cheta Adu since her wedding. [2]

c) What is the role of superstition in the poem the "Night of the Scorpion [2]

d) What are the themes and ideas explored in the poem "Night of the Scorpion"? [2]

e) Who are the biological Parents and adopted Parents of Steve Jobs? [2]

f) Explain the circumstances that led Steve Jobs to take up the Macintosh project. [2]

g) What expectations did the children have from their uncle's toys? [2]

h) Why did Harvey think elementary education needed to be rethought? [2]

i) What is intrapersonal communication and how does it relate to self-awareness? [2]

j) How can one overcome challenges with self help? [2]

PART-B **(50 Marks)**

Unit-I

2 a) Reflect on the theme of resilience and determination in the face of adversity. How does Mrs.Adu's desperation drive her to take bold actions, and what does this reveal about her character. [5]

b) Identify the parts of speech of the underlined words. [5]

1. Radhika is not coming today
2. My mom will be leaving for Bangalore tomorrow.
3. The teacher asked the students to stand.
4. He is my brother.
5. There is a cat under the table.

(OR)

3 What role does anger play in shaping Mrs.Cheta Adu's actions and decisions in detail? [10]

Unit-II

4 a) **Enunciate the central theme of the poem "Night of the Scorpion".** [5]

b) **Differentiate the homophones by writing their meanings.** [5]

1. **hear/here**
2. **sail/sale**
3. **whole/hole**
4. **knew/new**
5. **loose/lose**

(OR)

5 a) **How does the poem "Night of the Scorpion"depict the conflict between superstition and rationality?** [5]

b) **The sentences given in each question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a letter. Choose the most logical order of sentences from among the given choices to construct a coherent paragraph.** [5]

1. A. The two neighbours never fought each other.

B. Fights involving three male fiddler crabs have been recorded, but the status of the participants was unknown.

C. They pushed or grappled only with the intruder.

D. We recorded 17 cases in which a resident that was fighting an intruder was joined by an immediate neighbour, an ally.

E. We therefore tracked 268 intruder males until we saw them fighting a resident male.

1. BEDAC 2. DEBAC 3. BDCAE 4. BCEDA

Unit-II

6 a) Describe the major breakthrough in Steve Jobs life. [5]

b) **Write a Summary of the passage in about 100 words by giving it an appropriate title** [5]

Artificial intelligence (AI) is making a difference to how legal work is done, but it isn't the threat it is made out to be. AI is making impressive progress and shaking up things all over the world today. The assumption that advancements in technology and artificial intelligence will render any profession defunct is just that, an assumption and a false one. The only purpose this assumption serves is creating mass panic and hostility towards embracing technology that is meant to make our lives easier. Let us understand what this means explicitly for the legal world. The ambit of AI includes recognizing human speech and objects, making decisions based on data, and translating languages. Tasks that can be defined as 'search-and-find' type can be performed by AI.

Introducing AI to this profession will primarily be for the purpose of automating mundane, tedious tasks that require negligible human intelligence. The kind of artificial intelligence that is employed by industries in the current scene, when extended to the law will enable quicker services at a lower price. AI is meant to automate a number of tasks that take up precious working hours lawyers could be devoted to tasks that require discerning, empathy, and trust- qualities that cannot be replicated by even the most sophisticated form of AI. The legal profession is one of the oldest professions in the world. Thriving over 1000 years; trust, judgement, and diligence are the pillars of this profession. The most important pillar is the relationship of trust between a lawyer and clients, which can only be achieved through human connection and interaction.
While artificial intelligence can be useful in scanning and organizing documents pertaining to a case, it cannot perform higher-level tasks such as sharp decisionmaking, relationship-building with valuable clients and writing legal briefs, advising clients, and appearing in court. These are over and above the realm of computerization.
The smooth proceeding of a case is not possible without sound legal research. While presenting cases lawyers need to assimilate information in the form of legal research by referring to a number of relevant cases to find those that will favour their client's motion. Lawyers are even required to thoroughly know the opposing stand and supporting legal arguments they can expect to prepare a watertight defence strategy. AI, software that operates on natural language enables electronic discovery of information relevant to a case, contract reviews, and automation generation of legal documents.

(OR)

7 a) **What is the health concern of Steve Jobs and how did he overcome it?** [5]

b) Fill in the blanks with appropriate form of the verb given in the brackets [5]

1. While Rita _____(sing) Lata was dancing.
2. My aunt usually _____(go) to church every Sunday.
3. She_____(type) the letters since morning.
4. The Minister _____(arrive) here shortly.
5. They _____(complete) the work by next week.

Unit-IV

8 a) The creativity of Children is boundless. Describe how the children found an exciting way to play with their new non-violent toys. [5]

b) Send an email to your Team lead, seeking explanation regarding the client requirements of the new project that was assigned to you. [5]

(OR)

9 a) Do you think Harvey and Elizabeth's experiment failed? Justify your answer. [5]

b) Write a letter to your friend, inviting her/him to your birthday. [5]

Unit-V

10 a) Mention the different ways in which intrapersonal communication helps improve everyday life? [5]

b) Correct the following sentences [5]

1. Each of the books written by him are very interesting.
2. The lady who has been awarded the academy prize along with three more writers are on the board.
3. Children likes to play with toys.
4. Do you know the importance for clean water?
5. The teacher called me on 10 o clock.

(OR)

11 a) Reflect on the ways in which you can incorporate intrapersonal communication in your own life. [5]

b) Write an essay on the topic "AI is over powering Human resources" in about 150 words. [5]

Code No: R231104

R23

SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations January-2025
BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to AI&DS, AI&ML, CSE, CSE(AI&DS),CSE(AI&ML),CSE(AI), CSE(CS), CSE(DS) & IT)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part A & Part B
All the questions in Part-A is Compulsory
Answer ONE Question from Each Unit in Part-B
In Part A – Q.No. 1.a) to e) and in Part B Q.No. 2 to 7 should be answered at one place (may be upto page no. 17).
In Part A – Q.No. 1.f) to j) and in Part B Q.No. 8 to 13 should be answered at one place (may be from page no.18 to 32) in answer script.

*****

PART –A **(10 Marks)**

1 a) List the merits of prefabricated construction techniques? [1]
b) Define the terms Fine aggregate and Coarse aggregate? [1]
c) Define the term Contour? [1]
d) Identify the difference between Harbour and Port? [1]
e) Define the term "Hydrology"? [1]
f) Give some examples of smart materials? [1]
g) 3D manufacturing is superior than the other manufacturing processes. Justify the statement? [1]
h) State the functions of connecting rod in IC engine? [1]
i) Define nuclear fission and nuclear fusion? [1]
j) What is the difference between the joint and link? [1]

PART – B **(60 Marks)**

Basic Civil Engineering

Unit-I

2 Discuss the scope of Structural engineering and Geo-technical engineering. [10]

(OR)

3 Explain the classifications of bricks and the qualities of a good brick. [10]

Unit-II

4 Calculate the RL of all points, if the readings (in meters) were taken with a leveling instrument using a staff of 5m long. The readings were 2.81, 2.11, 3.89, 3.43, 1.97, 1.61, 2.25, 3.42, 2.36, 3.75, 4.3, 4.03, 1.92, 3.91, and 2.09. The instrument was shifted after the 5^{th}, 9^{th}, and 12^{th} reading. The first reading was taken on BM of RL 123m. [10]

(OR)

5 Report the Whole Circle Bearings for the following bearing system. [10]
i)N40^{0}W (ii)S36^0 45'E (iii)N72^{0}15'E (iv)S51^{0}E (v)S65^{0}30'E

Unit-III

6 Illustrate Harbour and its components with a neat sketch. [10]

(OR)

7 Discuss the rainwater harvesting system with a neat sketch. [10]

Basic Mechanical Engineering

Unit-I

8 a) Explain the role of mechanical engineers in the automotive sector [5]

b) Explain the procedure involved in the preparation of composite materials [5]

(OR)

9 a) Discuss the role of mechanical engineers in the Marine sector. [5]

b) Discuss the advantages and disadvantages of smart materials over the ferrous materials. [5]

Unit-II

10 a) Explain the working of one fire tube boiler with neat sketch [5]

b) Discuss the process involved in the casting process [5]

(OR)

11 a) Discuss the working of two stroke engine with neat sketches. [5]

b) Explain the processes in Otto cycle with P-v diagram. [5]

Unit-III

12 a) Explain the configurations stated in the manufacturing of robotics. [5]

b) Explain the working of open belt and cross belt drive with neat sketches. [5]

(OR)

13 Discuss the working of Hydro-electric power plant with neat sketch and also discuss the functions of components in the plant. [10]

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Code No: R231105 | R23 | SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations December-2024
INTRODUCTION TO PROGRAMMING
(Common to all branches)

Time: 3 hours | Max. Marks: 70

Question paper consists of Part A & Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.
*****

PART-A (20 Marks)

1 a) Define flowchart. Explain with an example. [2]

b) What are the requirements for Computer Problem Solving? [2]

c) What is the variable? Illustrate with an example. [2]

d) Give the differences between entry controlled and exit controlled loops. [2]

e) Why is it necessary to give the size of an array in an array declaration? [2]

f) What is pointer to pointer? [2]

g) Explain about Actual and Formal parameters. [2]

h) Define string. How string is declared and initialized? [2]

i) What are the advantages with bit fields? [2]

j) What is the difference between *fscanf() and fprintf()*? Give an example. [2]

PART-B (50 Marks)

Unit-1

2 a) What are the different Phases of Problem Solving? Explain. [5]

b) Define algorithm? Write the characteristics of an algorithm. [5]

(OR)

3 a) Write a short notes on the following Problem solving strategies [5]

i) Top down Approach ii) Bottom Up Approach.

b) What is algorithm analysis and explain various notations. [5]

Unit-2

4 a) Explain about relational and logical operators and write a C program by using these operators. [5]

b) Write program to check whether the given integer is palindrome or not by using for loop. [5]

(OR)

5 a) Develop a program to check whether the given number is Armstrong number or not? [5]

b) Explain different data types supported by C language with their memory requirements. [5]

Unit-3

6 a) Develop a program to count sum of even numbers in a given array. [5]

b) What is pointer? How to initialize and declare pointer variables? Explain with examples. [5]

(OR)

7 Develop a program using pointers to read in an array of integers and print its elements in reverse order. [10]

Unit-4

8 a) Develop a program to append the one string to another string without using predefined functions. [5]

b) What is the difference between iterative and recursive functions? [5]

(OR)

9 a) Develop a program to calculate the factorial of a given number using recursion. [5]

b) Explain the following string handling functions: [5]

(i) strcpy( ) (ii) strlen( ) (iii) strcat( ) (iv) strcmp( )

Unit-5

10 a) Write a C program to copy the contents of a text file to another file. Pass the filename using command line arguments. [5]

b) List the difference between structures and unions. Explain with an example. [5]

(OR)

11 a) Develop a C program to declare a structure with the following elements and for accessing them. 1. Name. 2. Age. 3. College 4.CGPA. [5]

b) List out modes of operations to open a file. Explain. [5]

*****

Code No: R231106

R23

SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations January-2025
ENGINEERING CHEMISTRY
(Common to CE, ME & AE)

Time: 3 hours Max. Marks: 70

Question paper consists of Part A, Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.
*****

PART-A

(20 Marks)

1 a) Differentiate between scale and sludge? [2]

b) What is meant by soft water? [2]

c) Write a short note on the primary cell? [2]

d) Define electro less plating. [2]

e) What is a polymer? and give examples. [2]

f) Write two properties of Nylon 6,6 & bakelite? [2]

g) Define flash and fire point. [2]

h) What is Portland cement? [2]

i) Write two applications of colloids. [2]

j) Define adsorption isotherm. [2]

PART-B

(50 Marks)

Unit-1

2 a) What is the principle of EDTA titration? How is the permanent hardness of water determined using the EDTA method? [5]

b) What are boiler troubles? Explain scale and sludge formation. [5]

(OR)

3 a) Describe the ion-exchange process for softening of water? What are its advantages and limitations? [5]

b) Explain the determination of dissolved oxygen by Winkler method. Give the reactions involved. [5]

Unit-2

4 a) Describe the construction, working principle of lithium ion batteries. [5]

b) Explain the electrochemical theory of corrosion. [5]

(OR)

5 a) Describe the construction and working of Hydrogen-Oxygen fuel cell? [5]

b) Give an account of the various factors influencing corrosion by giving suitable examples. [5]

Unit-3

6 a) Describe the preparations, properties and engineering uses PVC & polystyrene? [5]

b) Distinguish between chain growth and step growth polymerization process with suitable examples? [5]

(OR)

7 a) Discuss proximate method of analysis of coal sample and give its significance. [5]

b) Discuss the preparation, properties and applications of Buna-S & Thiokol Rubber. [5]

Unit-4

8 a) Explain the chemical processes involved in the setting hardening of cement. [5]

b) Give a brief note on structure reinforced composites and its applications? [5]

(OR)

9 a) Define refractories and what are the factors affecting the refractory materials and Applications. [5]

b) Write notes on the functions of lubricants and also on the mechanism of lubrication? [5]

Unit-5

10 a) Explain the BET Equation. [5]

b) What is colloid? Classify the colloids based on the physical state? [5]

(OR)

11 a) Write a brief note on applications of Colloids and Nano materials? [5]

b) Write a note on the micelle formation? [5]

*****

Code No: R231107

R23

SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations January-2025
ENGINEERING GRAPHICS
(Common to all branches of Engineering)

3 hours

Max. Marks: 70

Answer any **FIVE** Questions. **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) The distance between two towns is 250 km and is represented by a line of length 50mm on a map. Construct a scale to read 600 km and indicate a distance of 530 km on it [7M]
   b) A plot of ground is in the shape of a rectangle of size 100 x 60m. Inscribe an elliptical lawn in it. [7M]

(OR)

2. a) Construct a plain scale of convenient length to measure a distance of 1 cm and mark on it a distance of 0.94 cm. [7M]
   b) The major and minor axes of an ellipse are 80 mm and 50 mm respectively. Construct the curve. [7M]

UNIT-II

3. a) Draw the orthographic projections of the following points. [7M]
   (i) Point P is 30 mm. above H.P and 40 mm. in front of VP
   (ii) Point Q is 25 mm. above H.P and 35 mm. behind VP
   (iii) Point R is 35 mm. below H.P and 45 mm behind VP
   b) A top view of a 75 mm long line AB measures 65 mm, while the length of its front view is 50 mm. Its one end A is in the H.P. and 12 mm in front of the V.P. Draw the projections of AB and determine its inclination with H.P. and the V.P. [7M]

(OR)

4. a) A line CD 40 mm long is in V.P. and inclined to H.P. The top view measures 30 mm. The end C is 10 mm above H.P. Draw the projections of the line. Determine its inclination with H.P. [7M]
   b) A regular pentagon ABCDE, of side 25 mm side has its side BC on ground. Its plane is perpendicular to H.P and inclined at 45° to the V.P. Draw the projections of the pentagon when its corner nearest to VP is 15 mm from it. [7M]

UNIT-III

5. a) Draw the projections of a cone with diameter of the base as 40mm and axis 70mm long with its apex on H.P and 35mm from V.P. The axis is perpendicular to H.P. [7M]
   b) A cylinder with base 40mm diameter and 50mm long rests on a point of its base on HP such that the axis makes an angle of 30° with HP. Draw the projections of the cylinder. [7M]

(OR)

6. Draw the projections of a hexagonal prism of base 25mm side and axis 60mm long, when it is resting on one of its corners of the base on H.P. The axis of the solid is inclined at 45° to H.P. [14M]

UNIT-IV

7. a) A cube of 4S mm side rests with a face on HP such that one of its vertical faces is inclined at 30° to VP. A section plane, parallel to VP cuts the cube at a distance of 15mm from the vertical edge nearer to the observer. Draw its top and sectional front view. [7M]
   b) Draw the development of surfaces of a square prism of side of base 30mm and height 50 mm. [7M]

(OR)

8. a) A cylinder of base diameter 40 mm and height 60 mm rests on its base on HP. It is cut by a plane perpendicular to VP and inclined at 30° to HP and meets the axis at a distance 30 mm from base. Draw the front view, sectional top view, and the true shape of section. [7M]

b) Draw the development of surfaces of a square pyramid with side of base 30 mm and height 60 mm. [7M]

UNIT-V

9. Draw (i) Front View (ii) Top View (iii) Side View for the below figure. 1 [14M]
(All dimensions are in mm)

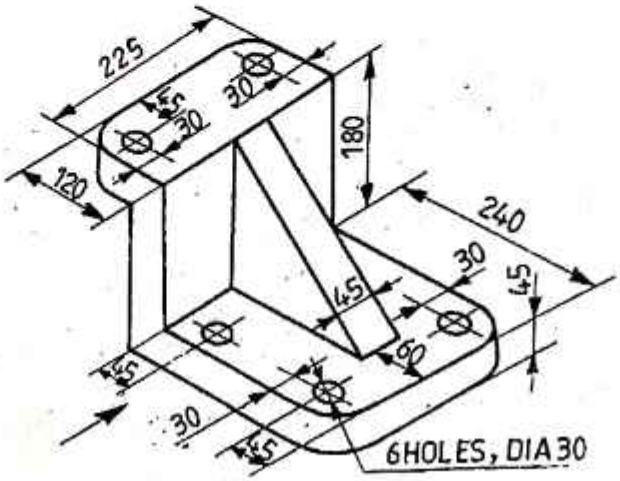

Figure: 1

(OR)

10. Draw the isometric view of the angle plate shown in below figure. 2 [14M]
(All dimensions are in mm)

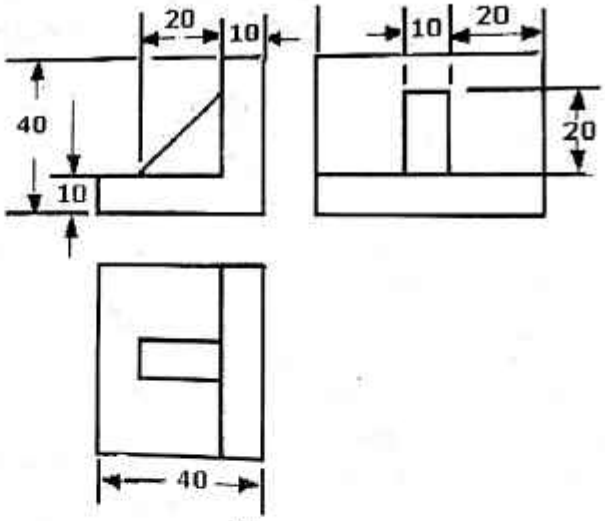

Figure: 2

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Code No: R231108 | R23 | SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations January-2025
BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Common to CE, ME, EEE, ECE & AE)

Time: 3 hours | Max. Marks: 70

Question paper consists of Part A &Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.
*****

PART-A (10 Marks)

Basic Electrical Engineering

1 a) State superposition theorem. [1]
b) Define Average value and RMS value. [1]
c) What are the conditions to be fulfilled for a DC shunt generator to build-up emf? [1]
d) What is the working principle of a Permanent Magnet Moving Coil (PMMC) instrument? [1]
e) What is the purpose of the two-part electricity tariff? [1]

Basic Electronics Engineering

f) Why does a PN junction diode not conduct in reverse bias under normal conditions? [1]
g) What is the main advantage of the Common Emitter configuration over the Common Base configuration? [1]
h) Why is a Zener diode used in a voltage regulator circuit? [1]
i) What are the three main blocks in a typical electronic instrumentation system? [1]
j) Write the Boolean expression for an XOR gate. [1]

(60 Marks)

PART-B

Basic Electrical Engineering

Unit-I

2 a) Explain Kirchhoff 's current and voltage law with suitable example. [5]
b) Find the impedance and the phase angle theta (θ) of an AC series RL circuit is made up of a resistor that has a resistance value of 150 Ω and an inductor that has an inductive reactance value of 100 Ω. [5]

(OR)

3 a) Find the branch currents by superposition theorem in the network shown in below figure.1 [5]

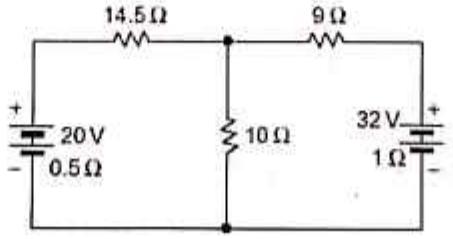

Figure: 1

b) Calculate the voltage across the coil has inductance of 400 mH and negligible resistance is connected to an AC supply in which an effective current of 6 mA is flowing. Assume the frequency is 1000 Hz. [5]

Unit-II

4 a) Explain the construction of D.C Motor with neat sketch. [5]

b) Explain the construction of PMMC Instrument. [5]

(OR)

5 a) Explain working principle of Single-Phase Transformer. [5]

b) Explain the operation of Wheatstone Bridge. [5]

Unit-III

6 a) Describe the layout of nuclear power plant. [5]

b) Explain the working principle of a fuse and a Miniature Circuit Breaker (MCB). [5]

(OR)

7 a) Differentiate between conventional and non-conventional energy resources. [5]

b) Estimate the total electricity bill when a family uses various household appliances throughout the month. The details of the appliances, their power ratings, and usage are provided in the below table. Energy Charge: ₹6 per unit (1 unit = 1 kWh). [5]

Appliance	Power Rating (W)	Usage (Hours per Day)	Number of Appliances
Ceiling Fan	75	8	3
Refrigerator	200	24	1
LED Bulbs	10	6	10
Air Conditioner	1500	4	1
Washing Machine	500	1	1

Basic Electronics Engineering

Unit-I

8 a) Illustrate the energy bands in semi-conductor materials. [5]

b) Construct the input and output characteristics of BJT in CC configuration. [5]

(OR)

9 a) Describe the working of PN Junction Diode. [5]

b) Describe the Small signal analysis of CE amplifier. [5]

Unit-II

10 a) Explain the working of a full wave bridge rectifier. [5]

b) Describe the working of RC Coupled amplifier with neat diagram. Also obtain its frequency response. [5]

(OR)

11 a) Illustrate working of simple Zener voltage regulator [5]

b) Illustrate block diagram of an electronic instrumentation system [5]

Unit-III

12 a) Construct truth table for half adder, and design half adder using logic gates. [5]

b) Solve the following Boolean expressions using the Boolean theorems. i) (A+B+C) (B'+C) +(A+D) (A'+C), (ii) (A+B) (A+B') (A'+B) [5]

(OR)

13 a) Construct truth table, logic symbol and Boolean expression for i)AND ii) X-OR iii) NOR iv) NAND v) NOT Gates. [5]

b) Compute the following binary numbers into their equivalent Gray code. i) 010101, ii) 0111011, iii) 101101, iv) 0110, v) 1101 [5]

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Code No: R231118

R23

SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Regular/Supplementary Examinations January-2025
CHEMISTRY
(Common to EEE & ECE)

Time: 3 hours Max. Marks: 70

Question paper consists of Part A, Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.
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PART-A **(20 Marks)**

1 a) What is the Significance of Ψ and Ψ2? [2]

b) What is the difference between an atomic orbital and a molecular orbital? [2]

c) Write two applications of fullerenes. [2]

d) Define semiconductors and give suitable example [2]

e) Define redox titration? Give two examples. [2]

f) What is called an electrochemical cell? [2]

g) Define biodegradable polymer. [2]

h) Write two applications of Teflon. [2]

i) What is the electromagnetic spectrum? [2]

j) Write two deviations of Lamberts-Beers law. [2]

PART-B **(50 Marks)**

Unit-1

2 a) Discuss particle in one dimensional box with suitable example. [5]

b) Explain bonding in homo and heteronuclear diatomic molecules using MO Theory. [5]

(OR)

3 a) Draw and explain the energy level diagram of CO [5]

b) Draw the π-molecular orbitals of butadiene. [5]

Unit-2

4 a) Explain the applications of superconductors. [5]

b) What are Nanoparticles? Write applications of Fullerene. [5]

(OR)

5 a) What are Super capacitors? How are they classified? [5]

b) Write an account on Carbon Nanotubes? [5]

Unit-3

6 a) Discuss about Acid- Base titrations using conducto-meter. [5]

b) Derive Nernst equation for a single electrode potential and explain the terms involved in it. [5]

(OR)

7 a) Describe the construction and working of Hydrogen-Oxygen fuel cell. [5]

b) Explain about potentiometric titrations. [5]

Unit-4

8 a) Explain coordination polymerization process with suitable examples. [5]

b) What are elastomers? Give the preparation, properties and applications of Buna-N . [5]

(OR)

9 a) Explain preparation, properties and applications of PGA and PLA. [5]

b) Write about mechanism of conduction and applications of polyacetylene and polyaniline. [5]

Unit-5

10 a) Discuss important biological applications of IR spectroscopy. [5]

b) Write about basic principle involved in Chromatography. [5]

(OR)

11 a) Explain Electronic transitions occur in UV-Visible spectroscopy. [5]

b) Discuss briefly components of an HPLC instrument. [5]

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