

I B.Tech II Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1201 DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

Time: 3 hours

(Common to All Branches)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Find the integrating factor of $\frac{dy}{dx} + y = \tan x$	K3	1	2M
	b	What is the substitution to convert the Bernoulli's equation $\frac{dx}{dy} - yx = y^3 x^2$ to linear equation	K3	1	2M
	c	Solve $(D^2 + 9)y = \sin 3x$	K3	2	2M
	d	What is PI for $(D^2 - 4)y = e^{-2x}$	K3	2	2M
	e	What is the subsidiary equation for Lagrange's Linear equation $Pp + Qq = R$	K3	3	2M
	f	Solve $px + qy = z$	K3	3	2M
	g	Define what is irrotational vector	K3	4	2M
	h	Compute $\text{Curl}(\text{grad } \phi)$ for the scalar point function ϕ	K3	4	2M
	i	State Gauss Divergence theorem	K5	5	2M
	j	State Green's theorem	K5	5	2M

PART-B

Answer either 'a', 'b' or 'c', 'd' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Solve $(x^2 - y^2)dx = 2xy dy$	K3	1	5M
		ii) Solve $(1 + y^2)dy = (\tan^{-1} y - x)dx$	K3	1	5M
	OR				
	b	i) If the temperature of the air is 30°C, and the substance cools from 100°C to 70°C in 15 minutes find when the temperature will be 40°C.	K3	1	5M
		ii) A bacterial culture, growing exponentially, increases from 200 to 500 grams in the period from 6 A.M. to 9 A.M. Measure in grams will be present at noon?	K3	1	5M
3	Unit-II				
	a	i) Solve $\frac{d^2 y}{dx^2} + 4y = \tan 2x$, by variation of parameters method.	K3	2	5M
		ii) Solve $(D^2 - 6D + 9)y = 6e^{3x} + 7e^{-2x}$	K3	2	5M
	OR				

	b	i) Solve $\frac{d^2 y}{dx^2} + \frac{dy}{dx} + y = (1 - e^x)^2$	K3	2	5M
		ii) The differential equation for a circuit in which self inductance and capacitance neutralize each other is given by $L \frac{d^2 i}{dt^2} + \frac{i}{c} = 0$. Find the current i as a function of t , given that I is the maximum current and the initial current is zero.	K3	2	5M
4	Unit-III				
	a	i) Form the PDE by eliminating arbitrary constants from $z = ax + by + a^2 + b^2$	K3	3	5M
		ii) Form the PDE by eliminating arbitrary functions from $Z = \phi(x^2 - y^2)$	K3	3	5M
	OR				
	b	Solve the PDE $(mx - ny) \frac{\partial z}{\partial x} + (nx - lz) \frac{\partial z}{\partial y} = (ly - mx)$	K3	3	10M
5	Unit-IV				
	a	i) Find the directional derivative of $\phi = x^2 y^2 z^4$ at the point A (3,1,-2). Find also the maximum directional derivative	K3	4	5M
		ii) Show that $\text{Div}(r^n \bar{R}) = (n+1)r^n, \text{Curl}(r^n \bar{R}) = \bar{0}$	K3	4	5M
	OR				
	b	i) Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point (2,-1,2)	K3	4	5M
		ii) If $F = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$ find out $\text{div}F$ and $\text{Curl}F$	K3	4	5M
6	Unit-V				
	a	i) Find the workdone in moving a particle of the force field $F = 3x^2 I + (2xz - y) J + z K$ along the straight line from (0,0,0) to (2,1,3)	K5	5	5M
		ii) Using Gauss divergence theorem evaluate $\int R \cdot dS = 3V$ where S is any closed surface enclosing the volume V where $r^2 = x^2 + y^2 + z^2$	K5	5	5M
	OR				
	b	Verify Green's theorem for $\int (xy + y^2) dx + x^2 dy$ over the curve bounded by $y = x \wedge y = x^2$	K5	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1202

DATA STRUCTURES

Time: 3 hours

(CSE,IT,AI,CS,DS,AI ML,CSE(AI ML))

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define a Data Structure.	K1	1	2M
	b	What do you mean by Time Complexity and Space Complexity? Give one example for each.	K1	1	2M
	c	What are the main components of a node in a singly linked list?	K1	2	2M
	d	List any two applications of linked lists.	K1	2	2M
	e	What is a Deque? Mention its two variants.	K1	4	2M
	f	Differentiate between Stack and Queue.	K1	3	2M
	g	Define a Tree.	K1	4	2M
	h	Differentiate between a Binary Tree and a Binary Search Tree (BST).	K1	4	2M
	i	Define a Graph	K1	5	2M
	j	Define Collision in hashing.	K1	6	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain different categories of data structures with suitable examples.	K2	1	5M
		ii) Given an array [25, 10, 30, 15, 5], perform Insertion Sort and show the array after each iteration.	K4	1	5M
	OR				
	b	i) Explain the working mechanism of Bubble Sort with an example.	K2	1	5M
		ii) Perform Binary Search on the sorted array [5, 8, 12, 16, 23, 38, 45, 57] to find the element 23. Show all intermediate steps.	K4	1	5M
3	Unit-II				
	a	i) Discuss the advantages and disadvantages of circular linked lists. Provide one real-world application.	K2	2	5M
		ii) Write an algorithm and draw the diagram to insert a node at the beginning, and at the end of a singly linked list.	K3	2	5M

	OR				
	b	Evaluate the performance of linked lists in various operations (insertion, deletion, traversal) compared to arrays and justify where linked lists are preferable.	K4	2	10 M
4	Unit-III				
	a	i) Convert the infix expression $(A + B) * (C - D)$ to postfix form and evaluate it for $A=2, B=3, C=5, D=1$.	K4	3	5M
		ii) Describe the implementation of a stack using arrays. What are the advantages and limitations of this approach?	K3	3	5M
	OR				
	b	i) Explain how a queue can be implemented using linked lists. Discuss the enqueue and dequeue operations with an example.	K2	4	5M
		ii) Explain the concept of circular queues. Write pseudocode for insertion and deletion operations in a circular queue implemented using an array.	K2	4	5M
5	Unit-IV				
	a	i) Explain the structure of a Binary Tree with suitable examples and diagrams.	K2	5	5M
		ii) Construct a Binary Tree from the given traversals: Inorder: D B E A F C Preorder: A B D E C F	K3	5	5M
	OR				
	b	i) Given the elements 50, 30, 70, 20, 40, 60, 80 — construct a Binary Search Tree (BST) and perform Inorder, Preorder, and Postorder traversals.	K3	5	5M
		ii) Discuss the algorithm to delete a node from a Binary Search Tree (BST). Explain all possible cases.	K4	5	5M
6	Unit-V				
	a	i) Given the undirected graph below, represent it using both adjacency matrix and adjacency list: Vertices: A, B, C, D Edges: (A,B), (A,C), (B,D), (C,D)	K2	5	5M
		ii) Explain hashing with an example. Illustrate how keys {23, 43, 13, 27, 32} are inserted into a hash table of size 10 using hash function $h(k) = k \bmod 10$.	K3	6	5M
	OR				
	b	i) Explain the Depth-First Search (DFS) traversal with a suitable diagram and step-by-step traversal order.	K2	5	5M
		ii) Design a simple hash table implementation pseudo code to insert and search an element using linear probing.	K4	6	5M

I B.Tech II Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1203

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Time: 3 hours

(CSE,IT,AI)

Max. Marks: 70

PART-A

R23

Q.No		Questions	KL	CO	M
1	a	How much current will flow through a 20Ω electric heater when a voltage of 200 V is supplied?	K1	1	1M
	b	Give the emf equation of a transformer	K1	2	1M
	c	What is the value for one unit	K2	3	1M
	d	State the need for a fuse	K1	3	1M
	e	What is the function yoke in a dc machine?	K1	2	1M
2	Unit-I				
	a	i) State and explain Kirchhoff’s laws.	K1	1	5M
		ii) Two resistances of 4 ohm and 6 ohms are connected in parallel across 10v battery. Determine the current through 6-ohm resistance.	K2	1	5M
	OR				
	b	i) Derive the expression for RMS and Average value of an alternating quantity (a sine wave).	K2	1	4M
		ii) A series circuit has R=10Ω, L=50mH and C=100μF and is supplied and is applied with 200V, 50 Hz. Find and examine the value of: (1) Impedance (2) Current (3) Power (4) Power factor	K3	1	6M
	Unit-II				
3	a	Explain the construction and principle of operation of DC motor.	K1	2	10M
	OR				
	b	i) With neat sketch describe the construction and principle of operation of Permanent Magnet Moving Coil (PMMC) type of instrument.	K2	2	10M
	Unit-III				
4	a	i) Explain with suitable Layout and operation of Hydel Power Generation system.	K1	3	10M
	OR				
	b	i) Explain two-part electricity tariff.	K1	3	5M
		ii) Describe the working of Miniature circuit breaker (MCB),	K1	3	5M

PART-B

Q.No		Questions	KL	CO	M
5	a	What is meant by Zener effect?	K1	4	1M
	b	What is a filter	K1	5	1M
	c	Draw the truth table of an ex-or gate.	K2	6	1M
	d	Draw the symbol for P-N-P transistor	K3	4	1M
	e	Draw the symbol of AND gate	K2	6	1M
6	Unit-IV				
	a	i) Describe the working of PN junction diode in forward and reverse bias condition.	K1	4	6M
		ii) Mention also the special properties of zener diode when compared to ordinary diode.	K1	4	4M
	OR				
	b	i) With neat sketch explain the input and output characteristics of a transistor in CB configuration.	K2	4	10M
7	Unit-V				
	a	i) Construct Block diagram of a dc power supply and explain.	K2	5	5M
		ii) working of a full wave bridge rectifier	K2	5	5M
	OR				
	b	i) Explain the working of a Public Address system with suitable Block diagram.	K2	5	5M
		ii) Outline the Circuit diagram and working of common emitter (RC coupled) amplifier	K2	5	5M
8	Unit-VI				
	a	i) Draw a half adder using logic gates. Explain with truth table with expression.	K3	6	5M
		ii) Explain the operation of R-S Flip-Flop.	K3	6	5M
	OR				
	b	Explain different types of counters and Draw a simple ring counter	K2	6	10M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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I B.Tech II Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1204

ENGINEERING GRAPHICS

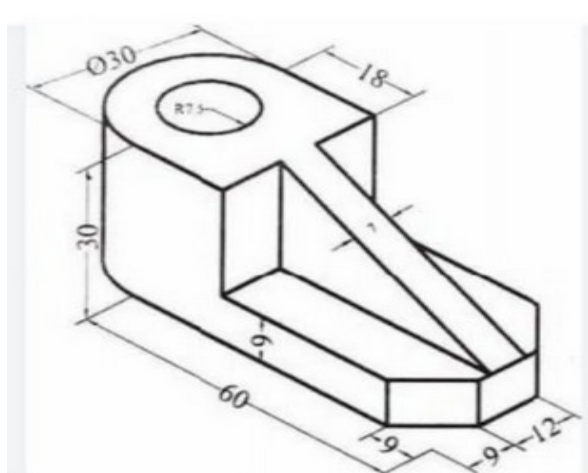
Time: 3 hours

(CSE-G-I-J)

Max. Marks: 70

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No		Questions	KL	CO	M
1		Unit-I			
	a	Construct an ellipse of focus 50mm by using eccentricity is $\frac{2}{3}$	K2	1	14M
		OR			
	b	Construct a plain scale of RF = 1:50 to read meters and decimeters. The scale should measure up to 5 meters. Show a distance of 3.7 meters on it.	K2	1	14M
2		Unit-II			
	a	A line PQ 80 mm long is inclined at 45° to HP and 30° to VP. End P is 15 mm above HP and 20 mm in front of VP. Draw its projections. The line lies in the first quadrant.	K3	2	14M
		OR			
	b	A circular lamina of 70 mm diameter rest on HP and is inclined at 40° to HP and perpendicular to VP. Draw its projections.	K3	2	14M
3		Unit-III			
	a	A cylinder of base diameter 50 mm and height 80 mm rests on HP on its base and the axis of cylinder is inclined at 45° to HP. Draw the projections.	K3	3	14M
		OR			
	b	A square prism of base side 35 mm and height 75 mm rests on its base on HP with one base edge inclined at 30° to VP. Draw the projections.	K3	3	14M
4		Unit-IV			
	a	A cone of base diameter 60 mm and axis height 70 mm rests on HP. It is cut by a plane parallel to VP and passing through a point 25 mm from the apex. Draw the sectional front view and top view.	K3	4	14M
		OR			
	b	A square pyramid of base side 40 mm and height 65 mm rests on HP with one base edge parallel to VP. It is cut by a plane inclined at 45° to HP and perpendicular to VP passing through the center of the axis. Draw the development of the surface	K3	4	14M
5		Unit-V			
	a	Draw the (i) Front view (ii) Top view and (iii) Side view for the fig.1 	K4	5	14M

OR				
b	Draw isometric view for the given orthographic projections shown in fig.2		K4	5
			14M	

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1204

ENGINEERING GRAPHICS

Time: 3 hours

(CSE-A-B-C-D-E&F)

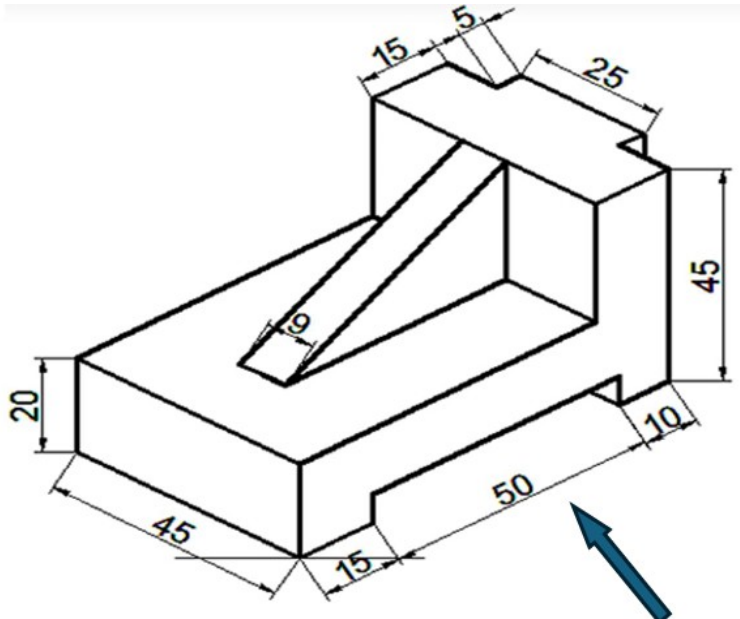
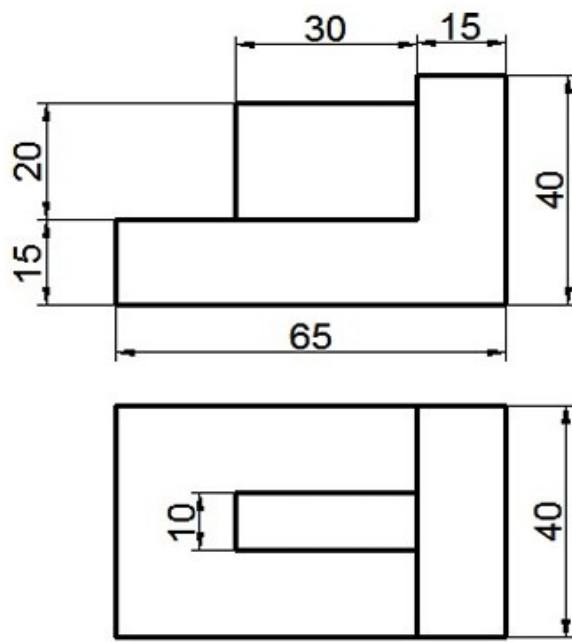
Max. Marks: 70

R23

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No		Questions	KL	CO	M
1		Unit-I			
	a	A circle of 50mm diameter rolls along a straight line without slipping. Draw the curve traced out by a point on the circumference, for one complete revolution of the circle. Name the curve. Draw a tangent to the curve at a point on it 40mm from the line.	1	3	14M
		OR			
	b	Draw a vernier scale of R.F.= 5 to read 1/5cm and 1/25 cm and to measure up to 5cm. Mark on the scale distances of 2.12cm.	1	3	14M
2		Unit-II			
	a	A Line AB is 80 mm long, is inclined at 30° to the H.P. and at 45° to the V.P. End A is 12mm above HP and 10mm in front of VP. Draw its projections.	2	3	14M
		OR			
	b	A thin 30°-60° set square has its straight edge of 100mm in the HP and inclined at 45° to V.P. The surface of the plate makes an angle of 30° with the H.P. Draw its projections.	2	3	14M
3		Unit-III			
	a	A hexagonal pyramid, base 30mm side and axis 75mm long, has an edge of its based on the H.P. and inclined at 60° to the ground and parallel to the V.P. Draw its projections.	3	3	14M
		OR			
	b	Draw the projections of a cylinder 75mm diameter and 100mm long, lying on the V.P. with its axis inclined at 30° to H.P. and parallel to the V.P.	3	3	14M
4		Unit-IV			
	a	A hexagonal pyramid of base side 20 mm and altitude 50 mm rests on its base on the HP with two edges of the base perpendicular to the VP. A cutting plane perpendicular to the VP and inclined at 45° to the HP cuts the pyramid at a height of 20 mm above the base. Draw the front view and the sectional top view.	4	3	14M
		OR			
	b	A pentagonal prism of base side 30 mm and axis length 75mm rests on the HP. Draw the development of surfaces.	4	3	14M

Unit-V					
5	a	Draw the (i) Front view (ii) Top view and (iii) Side view for the following figures. 	5	3	14M
	OR				
	b	Draw isometric view for the given orthographic projections. 	5	3	14M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1204

ENGINEERING GRAPHICS

Time: 3 hours

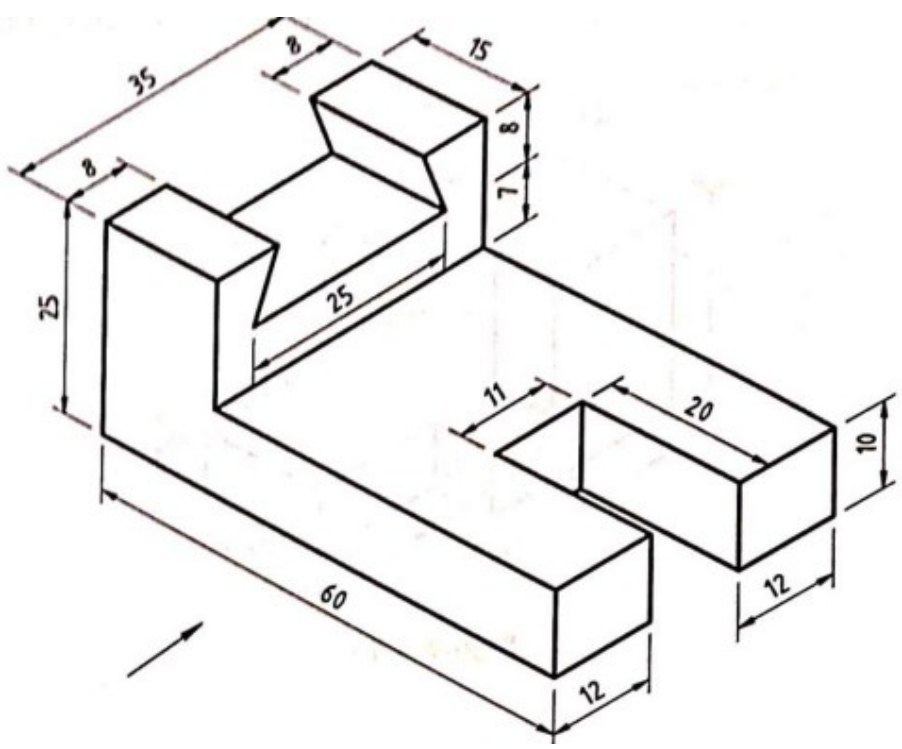
(IT, AI)

Max. Marks: 70

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No		Questions	KL	CO	M
1	Unit-I				
	a	Construct an ellipse when the distance between the focus and directrix is 50 mm and eccentricity is $\frac{2}{3}$. Also, draw the tangent and normal to any point on the curve.	K2	CO1	14M
	OR				
	b	Construct a scale of 1:5 to show decimeters and centimeters and long enough to measure upto 1 meter. Show a distance of 6.3 dm on it.	K2	CO1	14M
2	Unit-II				
	a	One end A of line AB, 75 mm long is 20 mm above HP and 25 mm in front of VP. The line is inclined at 30° to HP and the top view makes 45° to VP. Draw the projection of the line and find the inclinations with the vertical plane.	K3	CO2	14M
	OR				
	b	Draw the projection of a hexagonal plate whose side is 30 mm long, the surface of the plate is inclined at 30° to HP. which is rest on HP by one of its edges and is inclined at 45° to VP.	K3	CO2	14M
3	Unit-III				
	a	A hexagonal pyramid with a base side of 30 mm and an axis length of 60 mm is resting on one of its base edges with the face containing the resting edge perpendicular to both HP and VP. Draw its projections.	K3	CO3	14M
	OR				
	b	A cylinder of base diameter 50 mm and axis length 70 mm is resting on HP on a point on the circumference of the base with its axis inclined at 50° to HP and parallel to VP. Draw its projections	K3	CO3	14M
4	Unit-IV				
	a	A cone with a base diameter of 50 mm and an axis of 75 mm rests on its base on the HP. It is cut by a plane inclined at 45° to HP and perpendicular to VP and bisecting the axis. Draw the front view, sectional top view and true shape of the section.	K3	CO4	14M

	OR				
	b	A square prism of base side 30 mm and axis length 60 mm is resting on HP on one of its bases, with a base side inclined at 30° to VP. It is cut by a plane inclined at 40° to HP, perpendicular to VP and is bisecting the axis of the prism. Draw the development of the remaining portion of the prism.	K3	CO4	14M
5	Unit-V				
	a	Draw the front, top and left and right hand side view for the following figure 	K3	CO5	14M
	OR				
	b	Draw an isometric view of a cylinder, with a 50mm base diameter and a 70mm long axis when (a) The base is on the HP (b) when one of the generators is on the HP.	K3	CO5	14M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

R23

Sub Code: R23CC1205

ENGINEERING PHYSICS

Time: 3 hours

(CSE, IT, AI)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Mention any two characteristics of Lasers.	K1	1	2M
	b	Define numerical aperture in optical fibers.	K1	1	2M
	c	Draw the (100) and (010) planes	K1	2	2M
	d	State Bragg's Law.	K2	2	2M
	e	Define magnetic susceptibility.	K1	3	2M
	f	Discuss briefly about Meissner effect in superconductors.	K6	3	2M
	g	State the de-Broglie's hypothesis.	K2	4	2M
	h	Write the failures of Classical free electron theory.	K6	4	2M
	i	Mention the differences between intrinsic and extrinsic semiconductors.	K1	5	2M
	j	What is a piezo-electric material?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Define the terms-Spontaneous and Stimulated emission.	K1	1	4M
		ii) Describe the construction and working of Semiconductor laser.	K5	1	6M
	OR				
	b	i) Explain the various parts of an optical fiber.	K2	1	3M
		ii) Derive an expression for the acceptance angle and numerical aperture of an optical fiber.	K4	1	7M
3	Unit-II				
	a	i) Write the seven crystal systems and the relations among the lattice parameters and angle.	K6	2	7M
		ii) Obtain the packing fraction of SC system.	K4	2	3M
	OR				
	b	i) What are Miller indices? Explain	K1	2	2M
		ii) Discuss the Powder technique of X-ray diffraction in detail.	K6	2	8M
4	Unit-III				
	a	i) Describe the hysteresis B-H curve in ferromagnetic materials.	K2	3	6M
		ii) Distinguish between Soft and Hard magnetic materials.	K4	3	4M

	OR				
	b	i) What are superconductors and how are they classified into different types based on critical magnetic field?	K1 K2	3	5M
		ii) Discuss about the Phenomenon of AC & DC Josephson effects.	K6	3	5M
5	Unit-IV				
	a	i) Write a note on Physical significance of wave function.	K6	4	3M
		ii) Derive the Schrodinger's time-independent wave equation.	K4	4	7M
	OR				
	b	i) Explain the quantum free electron theory.	K2	4	5M
		ii) Derive the expression for electrical conductivity.	K4	4	5M
6	Unit-V				
	a	i) What are drift and diffusion currents?	K1	5	2M
		ii) Define Hall effect and obtain the expressions for Hall voltage and Hall coefficient of a semiconductor.	K1 K4	5	8M
	OR				
	b	i) What are smart materials and write its application in various fields.	K2	5	5M
		ii) Discuss the principle of piezoelectric, magnetostrictive and thermoelectric materials.	K6	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

R23

Sub Code: R23CC1206

COMMUNICATIVE ENGLISH

Time: 3 hours

(CE,EEE,ME,ECE,CSE(AIML),DS,CS,AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Briefly write the central theme of <i>The Gift of the Magi</i> in 3–4 sentences of your own.	K3	CO1	2M
	b	“State two situations where skimming and scanning can be applied.”	K3	CO2	2M
	c	“According to the poet, what message does <i>The Brook</i> convey to the readers?”	K3	Co2	2M
	d	Fill in the blanks with suitable prepositions a. The flight will arrive 7 a.m. Thursday. b. Hero jumped the river and swam the shore.	K3	CO3	2M
	e	Elaborate how Elon Musk contributed to renewable energy initiatives?	K3	CO1	2M
	f	Fill in the blanks with suitable verb forms. a Sheena (write) three books so far. b The children (wait) for you since morning.	K3	CO3	2M
	g	Write precisely what role do Harvey and Elizabeth play in highlighting human curiosity?	K3	CO1	2M
	h	Fill in the blanks with correct words: a The new rules had a great (effect/affect). b The soldiers showed immense (courage/courteous).	K3	CO4	2M
	i	How does intrapersonal communication help in self-reflection?	K3	CO1	2M
	j	Correct the following sentences: a) Kate don't know the answer. b) Each of the students have submitted their assignment.	K3	CO3	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) “Explain how the actions of Jim and Della demonstrate the deeper value of relationships over material possessions.”	K3	CO1	7M
		ii) Rewrite the jumbled sentences: a. Friends her with tennis plays always she. b. Park the in children the playing are. c. Quickly morning every rises Jim.	K3	CO3	3M
		OR			
	b	i) B. Identify the parts of speech for the following underlined words. A. <u>Honesty</u> is the best policy. b. He <u>quickly</u> solved the difficult problem. c. The little boy ran <u>fast</u> and won the race. d. I will call you <u>after</u> the meeting. e. Books are placed on the shelf <u>neatly</u> .	K3	CO3	5M

		ii) Write antonyms for the following: a. Expand b. Generous c. Constructive d. Ancient e. Optimistic	K3	CO4	5M
3	Unit-II				
	a	i) Explain in your own words “How does the imagery of flowing water in <i>The Brook</i> symbolize continuity of life?”	K3	CO1	7M
		ii) Write a short essay about 150 words on <i>The Role of Discipline in Student Life</i> .	K6	CO2	3M
	OR				
	b	i) Fill in the blanks with suitable articles: a My father bought orange from the market. b. The tourists visited Eiffel Tower during their trip. c. Sheetal is reading interesting novel. d. This is only chance we have. e. Rahul wants to become engineer.	K3	CO3	5M
		ii) Arrange the sentences in correct order to form a meaningful passage: a The teacher entered the classroom. b. The students stood up to greet him. c. He smiled and asked them to sit down. d. The lecture began with an inspiring story. e. Everyone listened with attention.	K3	CO3	5M
4	Unit-III				
	a	i) Evaluate how SpaceX has redefined space exploration in the 21st century.	K3	CO3	5M
		Fill in the blanks with correct form of “be” or “have”: a. The police investigating the case. b. My spectacles broken yesterday. c. The team already completed its task.	K3	CO3	5M
	OR				
	b	i) Fill in the blanks with suitable verb forms: a. Kiran (study) English for five years. b. The children (play) when the principal arrived. c. Our family (visit) the Taj Mahal last summer. d. By next year, Roshan (complete) his Ph.D. e. They (wait) for the bus for two hours	K3	CO3	5M
		ii) Correct the following sentences: a. She prefer tea to coffee. b. Either the teacher or the students is late. c. The furniture are very old. d. He is senior than me. e. When I reached the station, the train leave.	K3	CO3	5M
5	Unit-IV				
	a	i) Do you think the experiment in the lesson highlights both failure and learning? Discuss	K3	CO1	5M
		ii) Fill in the blanks with correct words: a. The Chief guest gave a (speech/speech) at the function. b. The medicine had a quick (effect/affect) on Raju. c. She was (quite/quiet) during the entire meeting.	K3	CO4	5M
	OR				
	b	i) Write a resume and a cover letter for the post of “Content Writer” in a Reputed MNC.	K6	CO2	5M

		ii) Rewrite the following sentences as directed: a. The coach praised the student. (Change into passive voice) b. A letter was written by her. (Change into active voice) c. Sohan said, "I am reading a novel." (Change into indirect speech) d. The boy said to me, "Do you know the answer?" (Change into indirect speech) e. They said, "We will go on a trip tomorrow." (Change into indirect speech)	K6	CO3	5M
6	Unit-V				
	a	i) Elaborate the importance of interpersonal skills in our day-to-day life with proper example.	K3	CO2	5M
		ii) Correct the errors in the following sentences: a. My sister is very good in Mathematics. b. John did not wrote the exam well. c. I am going to home now.	K3	CO3	5M
		OR			
	b	i) Write an essay on <i>The Role of Technology in Education</i>	K3	CO2	5M
		ii) Global warming is one of the greatest threats to humanity. Rising temperatures, melting glaciers, and unpredictable weather patterns are affecting ecosystems and human life. Immediate action is required to reduce carbon emissions and adopt sustainable practices. a. What is considered one of the greatest threats to humanity? b. Name two consequences of global warming. c. What is happening to glaciers due to global warming? d. What needs to be done to combat global warming? e. How does global warming affect ecosystems?	K3	CO1	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

R23

Sub Code: R23CC1207

CHEMISTRY

Time: 3 hours

(EEE,ECE,CSE(AIML),DS,CS,AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Give any two examples of Inter molecular H-bonding.	K1	1	2M
	b	Write any two characteristics of bonding molecular orbitals.	K1	1	2M
	c	Write any two applications of super conductors.	K1	2	2M
	d	Write any two properties of carbon nanotubes.	K1	2	2M
	e	Define Fuel Cell and give two examples.	K1	3	2M
	f	Write any two uses of PEMF cell.	K1	3	2M
	g	State the thermo-plastics with examples.	K1	4	2M
	h	Mention any two properties of Buna-N rubber.	K1	4	2M
	i	Define Beer-Lambert's law.	K1	5	2M
	j	Outline any two applications of NMR spectroscopy.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) How do you calculate bond order of hetero Di-atomic molecule using M.O diagram.	K1	1	5M
		ii) Discuss postulates of Molecular Orbital Theory.	K2	1	5M
	OR				
	b	i) Summarize π -Molecular Orbital energy level diagram of 1,3-Buta-diene	K5	1	5M
		ii) Explain Intra molecular hydrogen bonding with examples.	K2	1	5M
3	Unit-II				
	a	Explain properties and applications of Graphenes Nano-particles.	K2	2	10M
	OR				
	b	i) Explain Type-I superconductors with applications.	K2	2	5M
		ii) Discuss classification of super-capacitors.	K2	2	5M
4	Unit-III				
	a	i) Discuss the procedure for performing a potentiometric titration of a Redox reaction.	K2	3	5M
		ii) Explain weak acid Vs strong base conductometric titration.	K2	3	5M

	OR				
	b	i) Illustrate H ₂ -O ₂ fuel cell	K4	3	5M
		ii) Describe Polymer Electrolyte Membrane Fuel Cell	K2	3	5M
5	Unit-IV				
	a	i) Describe Co-ordination Polymerization with examples	K1	4	5M
		ii) Demonstrate compression moulding technique with a neat sketch	K3	4	5M
	OR				
	b	i) Explain preparation and properties of Buna-S Rubber.	K2	4	5M
		ii) Discuss applications of Poly Lactic Acid(PLA)	K2	4	5M
6	Unit-V				
	a	i) Discuss Beer-Lambert's law.	K2	5	5M
		ii) Illustrate UV-Visible instrumentation with a neat sketch	K2	5	5M
	OR				
	b	i) Demonstrate NMR instrumentation with block diagram	K3	5	5M
		ii) Demonstrate FT-IR instrumentation	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1208

ENGINEERING CHEMISTRY

Time: 3 hours

(CE,ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Explain how foaming can be removed in boilers?	1	1	2M
	b	Define electrodialysis.	1	1	2M
	c	Explain reactions occurring during electroless plating of copper.	2	2	2M
	d	Explain fuel cells.	2	2	2M
	e	Define thermoplastics. Give examples.	1	3	2M
	f	Define higher and lower calorific value.	1	3	2M
	g	Define composites.	1	4	2M
	h	Write the constituents of Portland cement.	2	4	2M
	i	Discuss preparation of Fullerenes.	2	5	2M
	j	What are colloids?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the formation of scales and how can they be reduced.	2	1	5M
		ii) Discuss any one method for desalination of brackish water.	2	1	5M
	OR				
	b	i) Explain how dissolved oxygen can be estimated.	2	1	5M
		ii) Discuss ion-exchange method for softening of hard water.	2	1	5M
3	Unit-II				
	a	i) Explain factors affecting the corrosion.	2	2	5M
		ii) Discuss the sodium ion battery.	2	2	5M
	OR				
	b	i) Explain metal oxide formation by dry electrochemical corrosion.	2	2	5M
		ii) Explain construction of calomel electrode with a labeled figure.	3	2	5M
4	Unit-III				
	a	i) Discuss preparation, properties and applications of Buna S.	2	3	5M
		ii) Explain free radical mechanism of chain growth polymerization.	2	3	5M

	OR				
	b	i) Write notes on (i) bio diesel (ii) cetane number	2	3	5M
		ii) Discuss ultimate analysis of coal sample.	2	3	5M
5	Unit-IV				
	a	i) Explain properties of refractories.	2	4	5M
		ii) Discuss classification of composites.	2	4	5M
	OR				
	b	i) Explain setting and hardening of cement.	2	4	5M
		ii) Explain the properties: viscosity, flash point and fire point of lubricant.	2	4	5M
6	Unit-V				
	a	i) Discuss sol-gel method for preparation of nanomaterials.	2	5	5M
		ii) Explain stabilization of colloids by stabilizing agents.	2	5	5M
	OR				
	b	i) Discuss types of carbon nano tubes.	2	5	5M
		ii) Explain any one method for synthesis of colloids with a neat sketch.	3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1209

ENGINEERING MECHANICS

Time: 3 hours

(CE,ME)

Max. Marks: 70

R23

Note: Question Paper consists of Two parts (Part-A and Part-B)

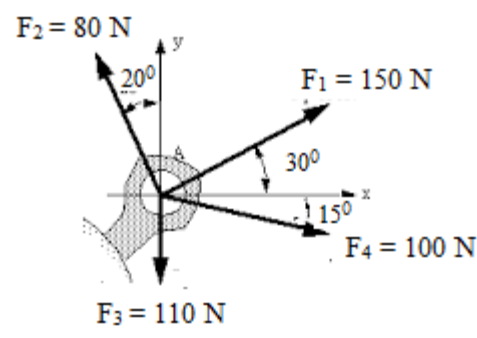
PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	State parallelogram law of forces.	KL2	1	2M
	b	Sketch coplanar concurrent forces system.	KL2	1	2M
	c	Sketch different types of supports used in plane trusses.	KL1	2	2M
	d	Define 'angle of friction'.	KL1	2	2M
	e	Distinguish between centroid and centre of gravity.	KL2	3	2M
	f	State the Pappus and Guldinus theorem related to volume of a solid.	KL2	3	2M
	g	What do you mean by 'Radius of gyration'?	KL1	4	2M
	h	Define mass moment of inertia.	KL1	4	2M
	i	What are the different types of mechanical energy?	KL2	5	2M
	j	State the principle of virtual work	KL2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	Determine the resultant of four forces acting concurrently at a machine bracket as shown in figure-1.  Figure -1: Machine bracket	KL3	CO1	10M
	OR				
	b	Two spheres rest in a horizontal channel as shown in figure -2. Calculate the reactions at the contact points A, B, C and D between the spheres; and spheres and channel walls and base.	KL3	CO1	10M

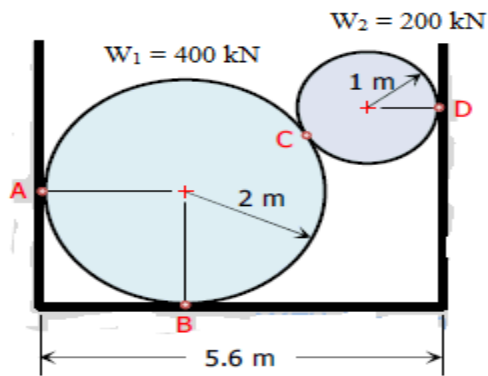


Figure -2: Channel with spheres.

Unit-II

Determine the forces in all members of a plane truss shown in figure-3.

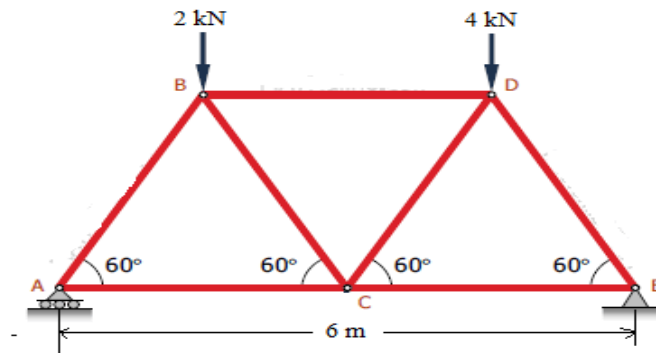


Figure - 3: Truss

OR

Two masses 25 kg and 15 kg are connected together by a string parallel to the inclined plane surface as shown in figure-4. The coefficient of friction between 25 kg mass and the plane is 0.25, while that of 15 kg mass and the plane is 0.40. Determine: (i) the value of the inclination of the plane surface ' θ ' for which the masses will just start sliding, and (ii) the tension in the string.

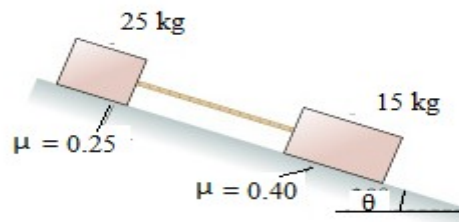


Figure - 4: Inclined plane with masses

Unit-III

Find the centroid of the composite section shown in figure-5 (All dimensions are in mm).

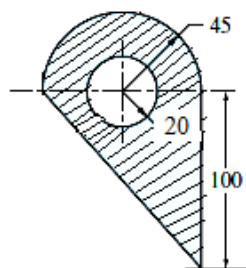
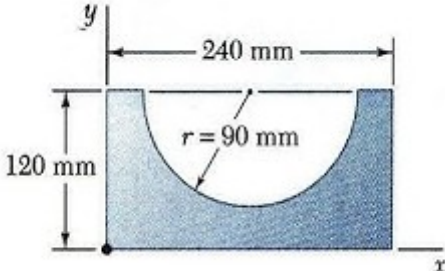
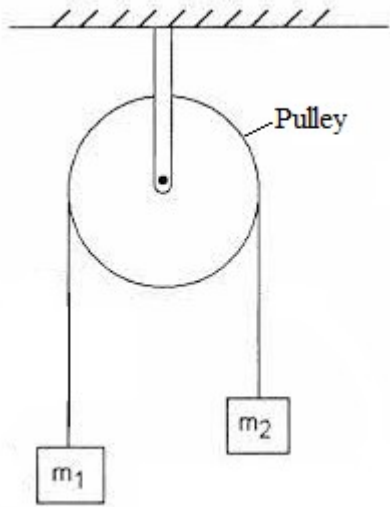


Figure-5: Composite section

	OR				
	b	Determine the centre of gravity of a solid hemisphere of radius 'r' from its diametral axis.	KL3	CO3	10M
5	Unit-IV				
	a	Find the area moment of inertia about the centroidal axes for the shaded area shown in figure-6  Figure-6: semi-circular cut in a rectangular lamina	KL3	CO4	10M
	OR				
	b	Derive an expression for the mass moment of inertia of a cylinder about the horizontal centroidal axis and about the centroidal transverse axis. Assume cylinder length l, radius R, and mass density ρ .	KL5	CO4	10M
	Unit-V				
6	a	i)The position of a particle in rectilinear motion is defined by the equation $x=t^3+3t+5$, where x is in meters and t is in seconds. Determine its position, velocity and acceleration at $t=2$ seconds. ii) A truck of mass 6 ton is moving on a level road at a speed of 80 kmph, when brakes are applied. If the braking force is of constant magnitude of 4 kN/ton, determine the distance it travels before coming to rest.	KL3	CO5	5M 5M
	OR				
	b	The block – and – pulley arrangement is shown in figure-7, when released from rest, determine: (i) the acceleration of blocks; (ii) the angular acceleration of pulley and (iii) the tension in each side of the string. Take $m_1=50\text{ kg}$, $m_2=30\text{ kg}$, Mass of the pulley = 20 kg and pulley radius = 150 mm.  Figure -7: Block & Pulley system	KL5	CO5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

R23

Sub Code: R23CC1210

ELECTRICAL CIRCUITS ANALYSIS-I

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

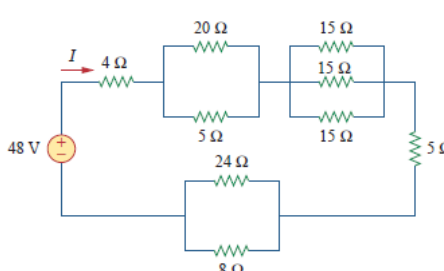
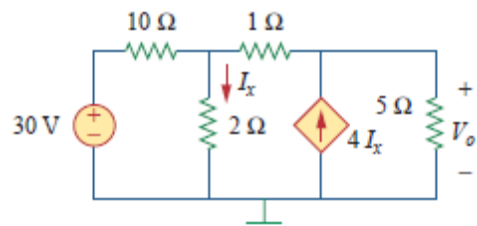
PART-A

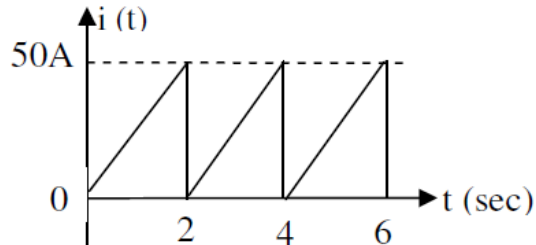
Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	State Kirchoff's laws	K1	1	2M
	b	Distinguish between independent and dependent sources	K1	1	2M
	c	Define MMF and flux	K1	2	2M
	d	What is the significance of coefficient of coupling in magnetic circuits?	K1	2	2M
	e	Define average value and form factor.	K1	3	2M
	f	Calculate the current drawn by impedance $Z=(30-j70)$ when voltage $V = 120 \angle 0^\circ$	K2	3	2M
	g	What is the significance of quality factor in series resonant circuit?	K1	4	2M
	h	What is a locus diagram?	K1	4	2M
	i	State Reciprocity theorem	K1	5	2M
	j	State compensation theorem.	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the source transformation with examples	K1	1	5M
		ii) Find I in the circuit	K2	1	5M
					
	OR				
	b	i) Explain the star – delta transformation by deriving relevant expressions.	K1	11	5M
		ii) Using nodal analysis, determine V_o in the circuit	K3	1	5M
					

3	Unit-II					
	a	i) Explain Faraday's laws of electromagnetic induction	K2	2	5M	
		ii) Two coils have a mutual inductance of 0.4 H, if the current in one coil is varied from 4A to 2A in 0.5sec, calculate (A) The average e.m.f induced in the second coil (B) The rate of change of flux linked with the second coil assuming that it is wound with 300 turns.		K2	2	5M
		OR				
b	i) Derive an expression for co-efficient of coupling in a magnetic circuit		K2	2	5M	
	ii) Two coils are mutually coupled, with $L_1 = 25 \text{ mH}$, $L_2 = 60 \text{ mH}$, and $k = 0.5$. Calculate the maximum possible equivalent inductance if: (A) the two coils are connected in series (B) the coils are connected in parallel		K2	2	5M	
4	Unit-III					
	a	i) Calculate RMS value, average value, form factor for the saw waveform shown in Figure 	K2	3	5M	
		ii) What is meant by the rms value of an ac quantity? Explain its practical importance.		K1	3	4M
	OR					
	b	i) Explain steady state analysis of RL series circuit with sinusoidal excitation		K2	3	5M
		ii) A coil resistance of 5 Ω and inductance 120mH in series with a 100 μF capacitor, is connected to a 300 V, 50 Hz supply Calculate (A) the current flowing (B) the phase difference between the supply voltage and current (C) the voltage across the coil (D) the voltage across the capacitor.		K2	3	5M
5	Unit-IV					
	a	i) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2 , the lower and upper half-power frequencies respectively		K2	4	5M
		ii) An inductive coil having a resistance of 30 ohm and inductance of 0.03H is connected in series with 0.03 μF capacitor. Calculate a) Q of the coil b) Resonant frequency and c) the half-power frequencies		K2	4	5M
	OR					
	b	i) Bring out the differences between series and parallel resonance		K1	4	4M
		ii) Show that the locus of current of a series circuit consisting of resistance and inductance with resistance varied and inductance reactance fixed, when supplied by a constant AC Voltage source, lies on circular path		K2	4	6M
6	Unit-V					
	a	i) State and explain Superposition theorem		K2	5	5M
		ii) Find the Thevenin's equivalent circuit with respect to terminals A and B for the network shown in figure		K3	5	5M

		OR			
		i) State and explain Maximum power transfer theorem	K2	5	5M
		ii) Find the Norton equivalent circuit of the circuit in Fig at terminals a - b .	K2	5	5M
	b				

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

I B.Tech I Semester Regular & Supple. Examinations, June-2026

Sub Code: R23CC1212

BASIC CIVIL AND MECHANICAL ENGINEERING

Time: 3 hours

(CE,EEE,ME,ECE,CSE(AIIML),DS,CS,AIIML)

Max. Marks: 70

R23

PART-A

(CE)

Q.No		Questions	KL	CO	M
1	a	What are the major constituents of cement?	K1	CO1	1M
	b	Mention two basic principles of survey.	K1	CO2	1M
	c	List the types of highways used in India.	K1	CO2	1M
	d	What are the different modes of transportation?	K1	CO3	1M
	e	What are dams? and its use.	K1	CO3	1M
Unit-I					
2	a	i) Discuss the major roles of a Civil Engineer in infra structural development of country.	K1	CO1	5M
		ii) Differentiate between Geo-technical Engineering and Water Resources Engineering.	K2	CO1	5M
	OR				
	b	Explain in detail the major uses of cement and steel in the construction industry	K2	CO1	10M
Unit-II					
3	a	i) Discuss about the primary classification of surveying.	K2	CO2	5M
		ii) Differentiate between horizontal measurement and angular measurement.	K1	CO2	5M
	OR				
	b	What is contouring and explain its characteristics	K2	CO2	10M
Unit-III					
4	a	i) Explain the role of highways in the Development of Nation.	K2	CO3	5M
		ii) Explain the major difference between Flexible and Rigid pavement.	K2	CO3	5M
	OR				
	b	What do you mean by ground water potential? Explain the water potential of water resources in India	K3	CO3	10M

PART-B (ME)

Q.No		Questions	KL	CO	M
5	a	What are Ceramics?	K1	CO1	1M
	b	Mention the major principles of Casting process.	K1	CO2	1M
	c	What are IC Engines?	K2	CO2	1M
	d	State the working principle of Steam plants.	K3	CO3	1M
	e	State the use of belt drive.	K2	CO3	1M
Unit-IV					
6	a	i) Differentiate between Ferrous and Non- Ferrous materials	K2	CO1	5M
		ii) What are Composite materials? Outline the applications of Composite materials.	K2	CO1	5M

	OR				
	b	Discuss in detail the role of mechanical engineers in the Aerospace sector	K3	CO1	10M
	Unit-V				
7	a	Define casting and Explain basic steps in casting process	K4	CO2	10M
	OR				
	b	Explain the basic components of a vapour compression refrigeration system with the help of a sketch. Draw p-h and T-S diagrams of the same.	K4	CO2	10M
	Unit-VI				
8	a	Describe the working principle of a Hydro power plant with a neat sketch	K3	CO3	10M
	OR				
	b	Explain different types of robots based on coordinate system	K4	CO3	10M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

I B.Tech II Semester Regular & Supple. Examinations, June-2026

R23

Sub Code: R23EC1211

NETWORK ANALYSIS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

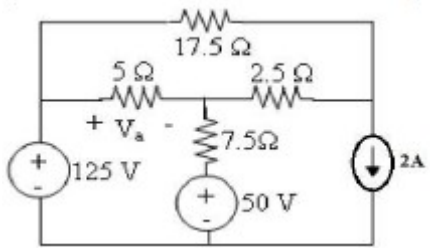
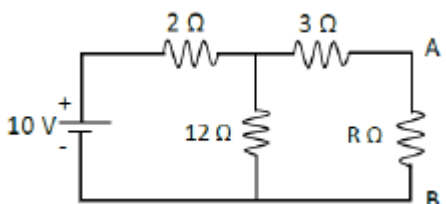
PART-A

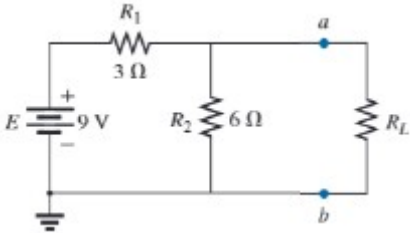
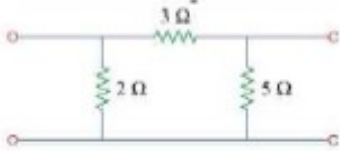
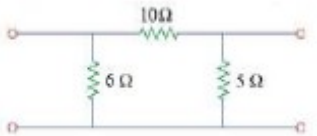
Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What do you mean by an electric network and an electric circuit?	K1	1	2M
	b	State the principle of duality.	K1	1	2M
	c	What is time constant? What are the time constants of series RL and RC circuits?	K2	2	2M
	d	Distinguish DC and AC excitations?	K1	2	2M
	e	What is meant by phase angle and Impedance?	K1	3	2M
	f	Draw a phasor diagram for parallel RC and RL circuit	K2	3	2M
	g	Define Quality factor	K1	4	2M
	h	Differentiate self-inductance and Mutual Inductance	K1	4	2M
	i	Express ABCD parameters in terms of h parameters.	K3	5	2M
	j	What is attenuator?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Find the value of V_a for the following circuit using KVL. 	K2	1	6M
		ii) Explain the concept of source transformation?	K1	1	4M
	OR				
	b	i) Find the maximum power delivered to the load by using maximum power transfer theorem for the following circuit. 	K2	1	5M

		ii) Find Norton's equivalent for the following circuit. 	K2	1	5M
3	Unit-II				
	a	Deduce the transient response source free series RL circuit	K3	2	10 M
	OR				
	b	i) (a) Explain about Natural & Forced Response of RLC Circuits. ii) Explain the complete response of source free parallel RLC Circuits.	K2	2	5M
4	Unit-III				
	a	i) Explain the phasor relation for series RL and RC circuit.	K2	3	5M
		ii) A 120V AC circuit contain 10 Ω resistance and 30 Ω inductive reactance in series. What is average power of this circuit.	K3	3	5M
	OR				
	b	i) A 120V AC circuit contain 10 Ω resistance and 30 Ω inductive reactance in series. What is average power of this circuit.	K2	3	5M
		ii) How to convert a given circuit into star to delta and delta to star	K3	3	5M
5	Unit-IV				
	a	A series RLC circuit has $R=10\Omega$, $L=0.5H$ and $C=40\mu F$. The applied voltage is 100V. Find (a) Resonant frequency & Quality factor of a coil (b) Bandwidth (c) Upper and lower Half power frequencies (d) Current at resonance & current at half power points (e) Voltage across inductance & voltage across capacitance at resonance.	K3	4	10 M
	OR				
	b	i) Explain about dot convention in mutually coupled circuits. ii) Discuss briefly about energy considerations in mutually coupled circuits	K1	4	5M
6	Unit-V				
	a	i) Find the Z- parameters for the following circuit. 	K2	5	10 M
	OR				
	b	i) Find the ABCD and h - parameters for the following circuit. 	K2	5	10 M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks