17/01/25

ARKA JAIN University
Jharkhand
JGi
NAAC GRADE A
ACCREDITED UNIVERSITY

Program	B. Tech
Branch	ME / EEE / CSE / AIDS / AIML
Semester	I
Subject Name	Engineering Mathematics-I
	Year January, 2025

Time: 3 Hour
Max. Marks : 70

- Start writing from 2nd page onwards; don't Write on the 1st Page Backside
- Answer all Questions of Section A (Compulsory)
- Answer Any Four out of Six of Section B
- Answer Any Three out of Five of Section C
- Possession of Mobile Phone or any kind of Written Material, Arguments with the Invigilator or Discussion with Co-Student will comes under Unfair Means and will Result in the Cancellation of the Paper(s).

Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q.N 1	QUESTIONS	Marks	COs	KL
i	State Rolle's theorem.	2	CO5	K1
ii	Find the rank of the matrix: $\begin{pmatrix} 1 & 3 & 3 \\ 0 & 0 & 0 \\ 1 & 2 & 3 \end{pmatrix}$.	2	CO5	K5
iii	Define homogeneous functions of the variables x, y, z.	2	CO4	K2
iv	If $f(x, y) = sin(x^2 + y^3)$, find $\frac{\partial^2 f}{\partial x^2}$ and $\frac{\partial^2 f}{\partial y^2}$.	2	CO3	K2
v	If u, v, w be three functions of three variables x, y, z. Write down the formula of their Jacobian, $J = \frac{\partial(u,v,w)}{\partial(x,y,z)}$.	2	CO1	K6
vi	Verify Rolle's theorem for $f(x) = (x-1)(x-2)(x-3)$ on [1,3]. If possible, find the required point c.	2	CO4	K3
vii	What are the three Elementary transformations (E-transformation)?	2	CO2	K4
viii	Expand $sin\ x$ in powers of x.	2	CO5	K3

10	Test the diagonalizability of $A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$. If it is diagonalizable find the corresponding diagonal matrix D to which A is similar to the same.	10	CO3	K4
11	If $I = \int_{x=1}^{2}\int_{y=0}^{2}(x^2y + yx^3)dxdy$ and $J = \int_{x=1}^{2}\int_{y=0}^{x}\frac{1}{x^2+y^2}dxdy$, find $I + J$.	10	CO6	K3
12	If $u_1 = \frac{x_2x_3}{x_1}$, $u_2 = \frac{x_3x_1}{x_2}$ and $u_3 = \frac{x_1x_2}{x_3}$, then find $\frac{\partial(u_1,u_2,u_3)}{\partial(x_1,x_2,x_3)}$	10	CO2	K2

CO- Course Outcomes,   KL- Knowledge Level,   PO – Program Outcome
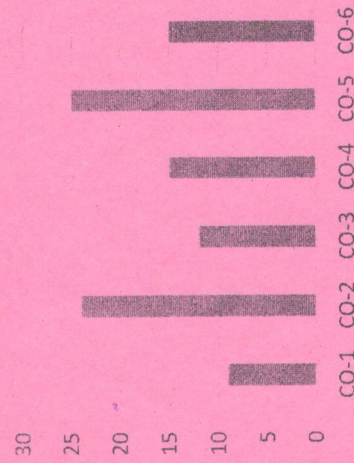
Course Outcomes	CO1	Remember the matrix representation of a set of linear equations and solve the solution of the system of equations
	CO2	Understand how to find the Eigenvalues and Eigen vectors
	CO3	Reduce the quadratic form to canonical form using orthogonal transformations.
	CO4	Solve the applications on the mean value theorems.
	CO5	Evaluate the improper integrals using Beta and Gamma functions
	CO6	Find the extreme values of functions of two variables with/ without constraints.

GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution

Course Outcome wise Marks Distribution

30
25
20
15
10
5
0

CO-1 CO-2 CO-3 CO-4 CO-5 CO-6

K1 K2 K3 K4 K5 K6

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ix	Find all eigen vectors of $A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ with respect to every eigen value/s of A.	2	CO5	K1
x	Check the consistency of the system of linear equations: $x + y = 1$; $y + z = 2$; $x + 2y + z = 5$	2	CO4	K6

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Find the derivative $\frac{dy}{dx}$ for $y = x^x + x^{\sin x}$.	05	CO4	K1
3	Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $a > b$.	05	CO3	K6
4	If $= \sin^{-1}\frac{x+2y+3z}{x^8+y^8+z^8}$, then find the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$.	05	CO6	K2
5	Using Cayley Hamilton theorem find the inverse of the matrix $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$.	05	CO4	K1
6	Find the rank of the given matrix by row reducing echelon form, $A = \begin{pmatrix} 1 & 3 & 4 \\ -2 & 1 & -1 \\ 3 & -1 & 2 \end{pmatrix}$.	05	CO1	K6
7	Verify Lagrange's theorem for $f(x) = x^3 - 3x$ on $[0,4]$. If possible, find the required point c.	05	CO5	K3

Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Prove by Taylor's theorem: $\tan^{-1}(x + h) = \tan^{-1} x + h\sin\alpha\frac{\sin\alpha}{1} - (h\sin\alpha)^2\frac{\sin 2\alpha}{2} + (h\sin\alpha)^3\frac{\sin 3\alpha}{3} - \cdots$, where $x = \cot\alpha$.	10	CO1	K2
9	The circle $x^2 + y^2 = a^2$ is revolving about x axis, find the volume of the solid formed.	10	CO4	K1

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NAAC GRADE A ACCREDITED UNIVERSITY

END SEM EXAMINATION
School of Engineering & IT

Program	B. Tech
Semester	I
Year	January, 2025

Branch	AIDS (IBM)
Subject Name	Software Foundation and Programming (With C++)

- Start writing from 2nd page onwards; don't Write on the 1st Page Backside
- Answer all Questions of Section A (Compulsory)
- Answer Any Four out of Six of Section B
- Answer Any Three out of Five of Section C
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Time: 3 Hour Max. Marks : 70

Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N	QUESTIONS	Marks	COs	KL
1				
i	Define object oriented programming.	2	CO1	K1
ii	Differentiate between for and while loop.	2	CO1	K2
iii	What is encapsulation?	2	CO2	K2
iv	Define object.	2	CO1	K1
v	Which type of language is C++?	2	CO3	K1
vi	What are the difference between class and object?	2	CO5	K4
vii	Describe inline function in C++ with example.	2	CO4	K2
viii	Write use of new operator.	2	CO5	K2
ix	List out different kind of polymorphism..	2	CO5	K2
x	What is functions? Give example.	2	CO5	K2

	CO1	Gain a strong foundation in programming languages, understanding their history, evolution, and paradigms to make informed language choices.
	CO2	Master Object-Oriented Programming principles, effectively applying encapsulation, inheritance, polymorphism, and class design techniques.
Course Outcomes	CO3	Develop practical skills in setting up C++ environments, writing programs, and understanding syntax, data types, and control flow.
	CO4	Proficiency in using conditional statements and looping structures in C++, ensuring efficient code.
	CO5	Apply functions, including overloading and argument passing, and implement OOP concepts like classes, objects, constructors, destructors, inheritance, and polymorphism

GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution

Course Outcome wise Marks Distribu

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

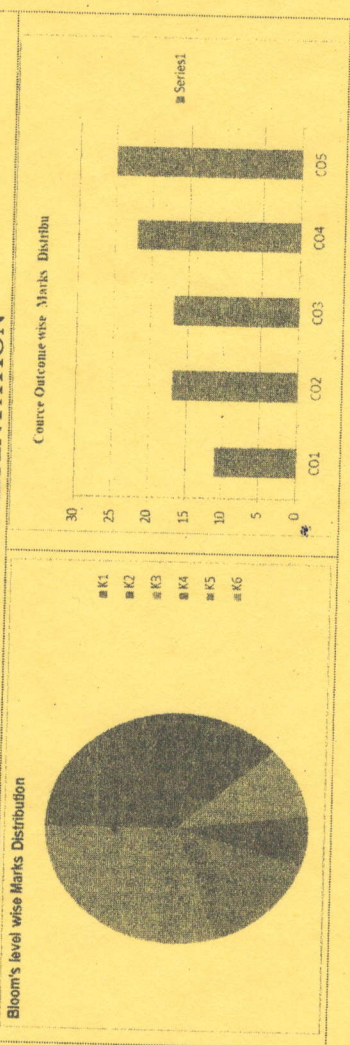| Q. No.	QUESTIONS	Marks	COs	KL
2	Describe various principles of Object oriented programming.	05	CO2	K2
3	Explain the various types of classes with example.	05	CO4	K2
4	Write a C++ program to swap two numbers.	05	CO1	K3
5	State the use of scope resolution operator and its use in C++.	05	CO3	K3
6	Explain constructor with example.	05	CO5	K5
7	State any four points of differentiation between compile time polymorphism and run time polymorphism.	05	CO4	K4

Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

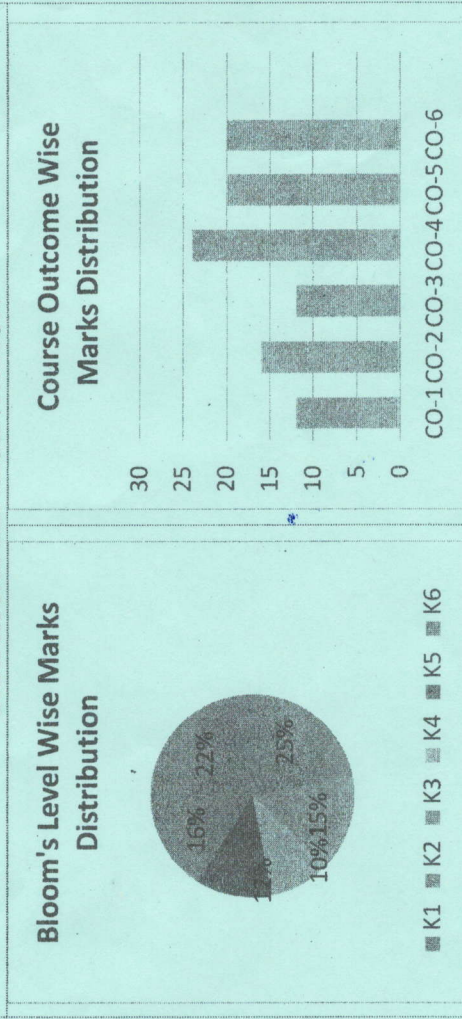| Q. No.	QUESTIONS	Marks	COs	KL
8	What are the features of Object oriented programming? Explain.	10	CO2	K1
9	Write a C++ program to perform arithmetic operations using classes.	10	CO5	K6
10	Write a C++ program to Operating overloading.	10	CO3	K6
11	Analyse the term: Abstraction, Message Passing, Encapsulation and subclass.	10	CO4	K5
12	Compose the difference between multilevel and multiple inheritance with example.	10	CO5	K6

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END SEM EXAMINATION
School of Engineering & IT

Branch	ME / EEE / AIDS	Program	B. Tech
Subject Name	Engineering Physics	Semester	I
		Year	January, 2025

- Start writing from 2nd page onwards; don't Write on the 1st Page Backside
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Time: 3 Hour Max. Marks : 70

Knowledge Level (KL)			
K1 : Remembering		K3 : Applying	K5 : Evaluating
K2 : Understanding		K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	Give Significance of Plank's Constant?	2	CO4	K2
ii	How Energy Band Formed in a solid?	2	CO4	K3
iii	Differentiate between the damped and Undammed Oscillations?	2	CO1	K4
iv	Summarize conditions for critical Damping?	2	CO1	K6
v	Lists Component of Laser?	2	CO2	K1
vi	Compute necessary conditions for obtaining sustained interference?	2	CO2	K3
vii	Classify Four Maxwell's equation?	2	CO3	K2
viii	Illustrate divergence of vector field?	2	CO3	K2
ix	Show How will you determine the V-I characteristics of a p-n diode?	2	CO6	K3
x	Why the Hall coefficient is negative for intrinsic semiconductor?	2	CO6, CO5	K1

CO- Course Outcomes,   KL- Knowledge Level,   PO – Program Outcome

	CO1	Remembering proficiency and perceptive of the basic concepts of different types of wave equations
	CO2	Understanding the principles of optics to solve various complex engineering problems.
	CO3	Apply fundamental laws and relations to evaluate problems in electricity and electromagnetism
Course Outcomes	CO4	Analyzing the kinds of experimental results which are incompatible with classical Physics leading to the development of a quantum theory of matter and light
	CO5	Evaluate principle, concept, working and application of new technology and comparison of results with theoretical calculations.
	CO6	Create and design a wide range of semiconductor devices through the basic concepts

GRAPHICAL REPRESENTATION

Bloom's Level Wise Marks Distribution

K1 K2 K3 K4 K5 K6

Course Outcome Wise Marks Distribution

CO-1 CO-2 CO-3 CO-4 CO-5 CO-6

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Derive time-dependent Schrodinger wave equation?	05	CO4	K5
3	Calculate the smallest possible uncertainty in the position of an electron moving with velocity 3×10^7 m/s.	05	CO4	K3
	OR			
	In Newton's ring experiment, the diameter of the 10th dark ring is 0.433 cm. Find the wavelength of incident light, if the radius of curvature of the lens is 70 cm?			
4	Find the Equation for displacement y of the particle executing SHM?	05	CO1	K4
5	Explain Stimulated and spontaneous emission of radiation?	05	CO2	K2
6	Discuss Displacement Current?	05	CO3	K6
7	Explain operation of Zener diode?	05	CO5	K2

Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

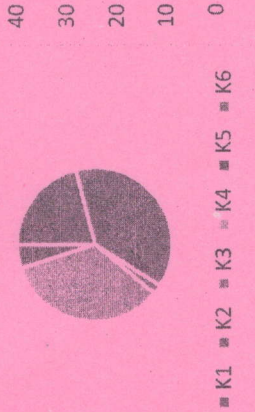| Q. No.	QUESTIONS	Marks	COs	KL
8	Establish energy Eigen value and energy Eigen function for a particle confined in a box.	10	CO4	K5
9	The amplitude of an oscillator of frequency 200 per second falls to 1/10 of its initial value after 2000 cycles. Calculate (i) relaxation time, (ii) quality factor and (iii) damping constant.	10	CO1	K3
10	Discuss the description of Ruby laser and explain the construction and working of it?	10	CO2	K6
11	State and prove Gauss's Divergence Theorem	10	CO3	K4
12	Derive an expression for the concentration of electrons in conduction band and holes in valence band intrinsic semiconductors?	10	CO6, CO5	K5

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END SEM EXAMINATION
School of Engineering & IT

Program	B.Tech
Branch	AIDS / ME / EEE
Subject Name	Sports and Yoga or NSS / NCC
Semester	I
Year	January, 2025
Time: 1.5 Hour	
Max. Marks : 35	

- Start writing from 2nd page onwards; **don't Write on the 1st Page Backside**
- Answer all Questions of Section A (Compulsory)
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Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 01 Marks from Q1-i to v) – 05 Marks

Q. N 1	QUESTIONS	Marks	COs	KL
i	What is the National Cadet Corps	01	CO1	K3
ii	What are the key duties and responsibilities of an NCC cadet	01	CO4	K1
iii	How many players are there in a cricket team?	01	CO2	K4
iv	How many players are allowed on the field for a cricket team during a match?	01	CO3	K1
v	How many players are there on the playing court for a handball team?	01	CO4	K3

Section B (Answer any FIVE out of SIX) – 10 Marks
(Each question Carry 02 Marks)

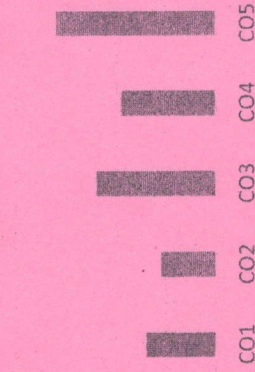| Q. No.	QUESTIONS	Marks	COs	KL
2	What is the full form of FIFA in Sports?	02	CO3	K3
3	What are the basic rules and regulations of cricket that players must follow during a match?	02	CO1	K2
4	What are the key benefits of participating in sports for physical and mental health?	02	CO2	K3
5	What is the role of a goalkeeper in football (soccer), and what special rules apply to them?	02	CO4	K5

6	How is a winner determined in a marathon?	CO1	K3
7	What are the key strategies for long-distance running?	CO2	K1

Section C (Answer any TWO out of FOUR) – 20Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	What is the National Cadet Corps (NCC), and how does it contribute to the development of discipline, leadership, and national service among youth in India?	10	CO2	K2
9	What are the key duties and responsibilities of a NSS students, and how do they contribute to the organization's mission of fostering discipline and patriotism?	10	CO1	K3
10	How does the NCC contribute to social service and community development, and what are some key activities undertaken by cadets in this area?	10	CO4	K5
11	What is the National Service Scheme (NSS), and how does it promote social welfare and volunteerism among students?	10	CO3	K2

CO- Course Outcomes,   KL- Knowledge Level,   PO – Program Outcome

Course Outcomes		
	CO1	Train volunteer youth to become confident, committed and competent leaders in all walks of life.
	CO2	Enhance awareness levels of cadets to become empowered and responsible citizens of the country.
	CO3	Undertake adventure activities to hone leadership qualities and risk taking abilities.
	CO4	Provide a platform to launch 'Good Will Ambassadors' to project the image of the country overseas.
	CO5	Provide opportunities and encourage cadets to enrich their knowledge, develop communication skills and build character.

GRAPHICAL REPRESENTATION

Bloom's Level wise Marks Distribution

K1 K2 K3 K4 K5 K6

Course Outcome Wise Marks Distribution

40 30 20 10 0

CO1 CO2 CO3 CO4 CO5

30/01/25

Extra

ARKA JAIN University
Jharkhand

NAAC GRADE **A**

JGI

END SEM EXAMINATION
School of Engineering & IT

Program	B. Tech
Branch	ME / EEE / AIDS
Semester	I
Subject Name	Basic Electrical Engineering
Year	January, 2025

Time: 3 Hour
Max. Marks : 70

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Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
i	Define Average value, RMS Value, Form Factor and peak factor.	2	CO1	K1
ii	Explain ohms law and write the properties of resistance	2	CO1	K2
iii	Classify the types of losses in a transformer	2	CO2	k2
iv	An alternating voltage is given by $V=230\sin 314t$. Calculate i) Frequency, ii) Maximum value, iii) Average value, iv) RMS value.	2	CO1	K2
v	Convert a voltage source of 24 V having a series internal resistance of 2 Ω into an equivalent current source.	2	CO2	K4

$R_{int} = 2\,\Omega$

24 V

CO - Course Outcomes,   KL- Knowledge Level,   PO – Program Outcome

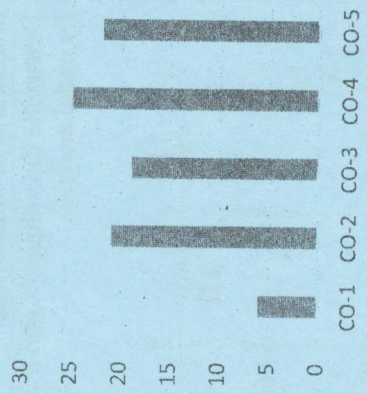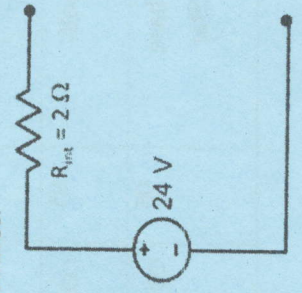| Course Outcomes		
CO1	Understand the basic knowledge of electrical quantities such as current, voltage, power, energy and frequency	
CO2	Solve the Problems of DC Circuits using different Laws (KVL, KCL, Mesh Analysis and Nodal Analysis)	
CO3	Analyze the Electrical Circuits by applying Theorems.	
CO4	Analysis of single-phase and three phase ac circuits.	
CO5	Identify the type of electrical machine used for that particular application.	
CO6	Design Three Phase induction motor	

GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution

K1   K2   K3   K4   K5

Cource Outcome wise Marks Distribution

CO-1   CO-2   CO-3   CO-4   CO-5

Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Three impedances each consisting of 20 Ω and 15 Ω inductive reactance in series are connected in star across 400 V 3 φ supply. Calculate the i) line current ii) phase current iii) total power consumed and iv)the p.f of the load.	10	CO4	K5
9	State & Explain the typical torque-slip characteristics of 3 phase induction motor.	10	CO5	K3
10	Discuss in detail the difference between the core type and shell type transformer.	10	CO5	K3
11	Determine the voltages 1 and 2 of the network in Fig. by nodal analysis.	10	CO2	K5
12	For the circuit shown in Fig, calculate the current in the 10 ohm resistance. Use Thevenin's theorem only	10	CO3	K5

			CO3	K1
vi	What do you mean by time domain analysis? Discuss.	2	CO3	K1
vii	Give the Comparison of Series and Parallel Resonant Circuit.	2	CO3	K3
viii	Derive an expression of Pure Resistive AC Circuit. Draw the circuit diagram, wave form and phasor diagram.	2	CO2	K4
ix	Define Slip of Induction Motor	2	CO5	K1
x	Differentiate between AC and DC Circuit.	2	CO4	K1

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Find Vo using source Transformation.	05	CO2	K4
3	Write the Principle of a Transformer and define turns ratio.	05	CO5	K3
4	Derive an Expression of first-order RL circuit.	05	CO4	K4
5	State Superposition. Write the steps to solve the super position theorem with circuit diagram.	05	CO3	K4
6	Why single phase induction motors are not self-starting? Explain in brief.	05	CO5	K2
7	Derive an expression for Line Voltage and Phase Voltage, Line Current and Phase Current in Star connection in three phase ac Circuit.	05	CO4	K4

22/01/25

Branch	ME / EEE / AIDS
Subject Name	Computer Aided Engineering Graphics
Program	B. Tech
Semester	I
Year	January, 2025

Time: 1.5 Hour
Max. Marks : 35

- Start writing from 2nd page onwards; don't Write on the 1st Page Backside
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Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 01 Marks from Q1-i to v) – 05 Marks

Q. N 1	QUESTIONS	Marks	COs	KL
i	Write Different method of dimensioning.	01	CO1	K1
ii	What is the Difference between Sketch & Engg. Drawing.	01	CO2	K1
iii	What do you mean by R.F. / Scale Ratio?	01	CO2	K1
iv	Name the different types of drawing instruments.	01	CO2	K1
v	What conic section is formed if a cutting plane cuts the cone parallel with base.	01	CO3	K1

Section B (Answer any FIVE out of SIX) – 10 Marks
(Each question Carry 02 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Difference between plain scale & diagonal scale.	02	CO1	K2
3	If a line makes different angle with both the plane (HP &VP) then what will be the length of line in front view & top view (explain).	02	CO2	K5
4	Why 4th angle projection not in use explain.	02	CO2	K5
5	Difference between 1st angle & 3rd angle projection.	02	CO2	K4

CO- Course Outcomes,   KL- Knowledge Level,   PO – Program Outcome

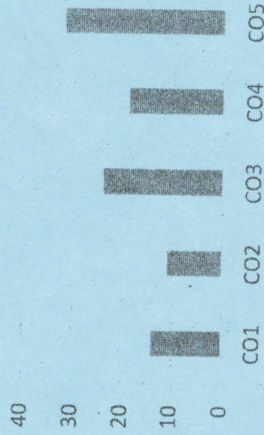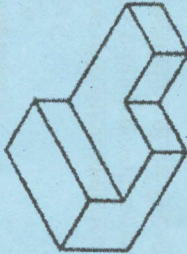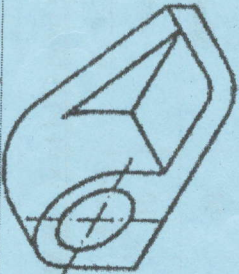|	
Course Outcomes	CO1	Students will understand the role of CAD in mechanical component and system design by creating geometric models and engineering drawings
	CO2	Students will understand the basic mathematics fundamental to CAD software
	CO3	Students will work in teams to design a mechanical system and fabricate a prototype of their design
	CO4	Upon completion of this course, the students can use computer and CAD software for modelling mechanical components.
	CO5	Design and analysis of engineering components.

GRAPHICAL REPRESENTATION

Bloom's Level wise Marks Distribution

K1 K2 K3 K4 K5 K6

Course Outcome Wise Marks Distribution

40
30
20
10
0

CO1 CO2 CO3 CO4 CO5

6	What is true length & foreshortened length of a line.	02	CO2	K2
7	What are the different sizes of drawing sheet in ISI Std.	02	CO2	K4

Section C (Answer any TWO out of FOUR) – 20Marks
(Each question Carry 10 Marks)

Q.No.	QUESTIONS	Marks	COs	KL
8	Draw the Front, Top and Side view for shown fig.	10	CO1	K2
9	Draw the Front, Top and Side view for shown fig.	10	CO1	K2
10	A point A is 25 mm above the H.P and 30 mm in front of the V.P. Draw its projections.	10	CO2	K5
11	A line PQ, 90 mm long, is in the H.P and take an angle 30⁰ with the V.P. Its end P is 25 mm in front of the V.P. Draw its Projections.	10	CO2	K2