O.P.Code: 23HS0836	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

DISCRETE MATHEMATICS & GRAPH THEORY

(Common to CSIT, CSE, CIC, CCC, CAI, CSM and CAD)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Construct a truth table for Biconditional.	CO1	L3	2M
	b	Define Duality law.	CO1	L1	2M
	c	State Principle of Inclusion-Exclusion for three sets.	CO2	L1	2M
	d	Find the smallest value of x under the multiplication modulo5, if $3 \times_5 x = 1$.	CO2	L1	2M
	e	Find the value of n, if $C(n,7) = C(n,5)$.	CO3	L1	2M
	f	State Multinomial theorem.	CO3	L1	2M
	g	b) Find the generating function for the sequence 1,1,0,1,1,1, $\cdots$.	CO5	L3	2M
	h	Solve $a_n - 4a_{n-1} = 0$.	CO5	L3	2M
	i	Define Complete bipartite graph with example.	CO6	L1	2M
	j	Define spanning tree with example.	CO6	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	What is Principal conjunctive normal form? Obtain the Principal conjunctive normal form of $(\sim p \rightarrow r) \wedge (q \leftrightarrow p)$ without using truth table.	CO1	L1	5M
	b	Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.	CO1	L3	5M

OR

3	a	Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises. $P \vee Q, Q \rightarrow R, P \rightarrow M$ and $\sim M$.	CO1	L2	5M
	b	Verify the validity of the following arguments: Lions are dangerous animals, there are lions. Therefore, there are dangerous animals.	CO1	L4	5M

UNIT-II

4	a	Define and give examples for semi group, Monoid, Group.	CO2	L1	5M
	b	If A = {1,2,3,5,30} and R is the divisibility relation, prove that (A, R) is a Latticesbut not a distributive Lattices.	CO2	L3	5M

OR

5	a	Show that the set of all positive rational numbers forms an abelian group under the composition defined by $a * b = \frac{ab}{2}$.	CO2	L2	5M
	b	Explain the concepts of homomorphism and isomorphism of groups with examples.	CO2	L2	5M

UNIT-III

6	a	How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8 and 9 if no repetitions are allowed?	CO3	L2	5M
	b	Find the number of arrangements of the letters in the word MATHEMATICS.	CO3	L3	5M

OR

7	a	Find how many solutions are there for $x_1 + x_2 + x_3 = 17$, subject to the the constrainats $x_1 > 1, x_2 > 2, x_3 > 3$.	CO3	L1	6M
	b	Find the co-efficient of x^3y^7 in $(x+y)^{10}$	CO4	L3	4M

UNIT-IV

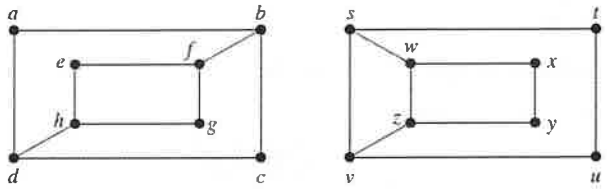
8	a	What is the solution of the recurrence relation $a_n = a_{n-1} + 2a_{n-2}$, for $n \geq 2$ with the initial conditions $a_0 = 2$ and $a_1 = 7$.	CO5	L3	5M
	b	Solve $a_n - 5a_{n-1} + 6a_{n-2} = 0$.	CO5	L3	5M

OR

9		Solve the recurrence relation using generating functions $a_n - 9a_{n-1} + 20a_{n-2} = 0$, for n $\geq$ 2 ith the initial conditions $a_0 = -3$ and $a_1 = -10$.	CO5	L3	10M

UNIT-V

10	a	Show that the two graphs shown below are isomorphic ?	CO6	L2	5M



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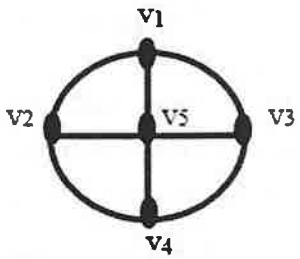
	b	Draw the graph represented by given adjacency matrix (i) $\begin{bmatrix} 0 & 2 & 0 & 1 \\ 2 & 0 & 3 & 0 \\ 0 & 3 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$ (ii) $\begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & 1 & 2 \\ 2 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{bmatrix}$	CO6	L2	5M

OR

11	a	Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$.	CO6	L1	5M
	b	Find the number of vertices, number of edges and the number of regions for the following graph and verify the Euler's formula.	CO6	L3	5M



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O.P.Code: 23HS0834	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

NUMERICAL METHODS & TRANSFORM TECHNIQUES

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Find the root of the equation $x^2 - 5 = 0$ by using Bisection method.	CO1	L2	2M
	b	Solve by Jacoby method $x + y = 3\,; 3x - 2y = 4$ Only two iterations.	CO1	L5	2M
	c	Construct a forward difference table for the function $y = x^2$ for x = 0, 1, 2, 3.	CO2	L3	2M
	d	Write the normal equations used in fitting a second degree polynomial.	CO2	L1	2M
	e	State Euler formula to solve $y' = f(x,y),\ y(x_0) = y_0\ at\ x = x_0 + h.$	CO3	L1	2M
	f	If $\frac{dy}{dx} = y - x\,; y(0) = 2, h = 0.2$ then Find the value of k_1 in R–K method of fourth order.	CO4	L1	2M
	g	What is the Linear Property of Laplace Transform.	CO5	L1	2M
	h	State First Shifting Theorem.	CO5	L1	2M
	i	Write the Euler's formula for Fourier Series.	CO6	L1	2M
	j	Write the formula for Fourier cosine transform.	CO6	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Find a positive root of the equation $x^4 - x - 10 = 0$ by iteration method.	CO1	L1	5M
	b	Solve $x^3 - 2x - 5 = 0$ for a positive root by iteration method.	CO1	L3	5M

OR

3		Apply Gauss Siedel iteration method to solve equations $\mathbf{20x + y - 2z = 17\,; 3x + 20y - z = -18; 2x - 3y + 20z = 25.}$	CO1	L3	10M

UNIT-II

4		From the following table values of x and $y=tan\ x$. Interpolate the values of y when $x=0.12$ and $x=0.28$.	CO2	L5	10M

x	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2027	0.2553	0.3093

OR

5		Find the curve of best fit of the type $y = ae^{bx}$ to the following data by method of least squares	CO2	L1	10M

X	1	5	7	9	12
Y	10	15	12	15	21

UNIT-III

6		Find an approximate value of $y\ for\ x = 0.1$ by Picard's method, given that $\frac{dy}{dx} = x + y\,, y(1) = 1\,.$	CO3	L1	10M

OR

7	Using Runge – Kutta method of fourth order, find $y(0.1)$ *and* $y(0.2)$ given that $\frac{dy}{dx} = x + y, y(0) = 1$.	CO4	L3	10M

UNIT-IV

8	**a** Find the Laplace transform of $t^2e^{2t}\sin 3t$.	CO5	L3	6M
	b Find the Laplace transform of $e^{4t}\sin 2t \cos t$.	CO5	L3	4M
	OR			
9	**a** Find the Inverse Laplace transform of $\frac{1}{s(s^2+a^2)}$.	CO5	L3	5M
	b Find $L^{-1}\left\{\frac{s-2}{s^2+5s+6}\right\}$.	CO5	L3	5M

UNIT-V

10	Expand $f(x) = \|x\|$ as a fourier series in the interval $(-2,2)$.	CO6	L3	10M
	OR			
11	Find the Fourier sine and cosine transforms of f(x)=$e^{-ax}, a > 0$and hence deduce the integrals (i) $\int_0^\infty \frac{p\sin px}{a^2+p^2}dp$ (ii) $\int_0^\infty \frac{\cos px}{a^2+p^2}dp$.	CO6	L1	10M

***** END *****

O.P.Code: 23HS0833	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

COMPLEX VARIABLES & NUMERICAL METHODS

(Electrical & Electronics Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define analytic function.	CO1	L1	2M
	b	Find where the function $w = \frac{1}{z}$ ceases to be analytic.	CO1	L2	2M
	c	State Cauchy Integral formula.	CO2	L1	2M
	d	State Cauchy Residue theorem.	CO2	L1	2M
	e	Find the root of the equation $x^2-5=0$ by using Bisection method.	CO3	L2	2M
	f	Write the formula to find the root of an equation by Newton Raphson's method.	CO3	L1	2M
	g	Construct a forward difference table for the function $y = x^2$ for x = 0, 1, 2, 3.	CO5	L3	2M
	h	Write the normal equations used in fitting a second degree polynomial.	CO5	L1	2M
	i	Find $y^{(1)}(x)$, by Picard's method, given that $\frac{dy}{dx} = 1 + xy$; $y(0)=1$.	CO6	L2	2M
	j	Write the formula for Runge – Kutta method of fourth order.	CO6	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2		Verify that $u=x^2-y^2-y$ is harmonic in the whole complex plane and find a conjugate harmonic function v of u?	CO1	L4	10M

OR

3	a	Determine whether the function $f(z)=2xy+i(x^2-y^2)$ is analytic.	CO1	L5	5M
	b	Find the analytic function f(z) interms of z whose real part is x^3-3xy^2.	CO1	L1	5M

UNIT-II

4	a	Evaluate $\oint \frac{e^{2z}}{(z-1)(z-2)} dz$ where 'c' is the circle $\|z\|=3$.	CO2	L5	5M
	b	Evaluate $\oint \frac{e^{z}}{(z-1)(z-4)} dz$ where 'c' is the circle $\|z\|=2$.	CO2	L5	5M

OR

5		Evaluate $\oint \frac{4-3z}{z(z-1)(z-2)} dz$ where 'c' is circle $\|z\|=\frac{3}{2}$ using residue theorem.	CO2	L5	10M

UNIT-III

6	Find a real root of the equation $e^x \sin x = 1$ using Newton – Raphson method.	CO3	L1	10M

OR

7	Solve the following system of equations by Jacobi method $2x-3y+20z=25$; $20x+y-2z=17$; $3x+20y-z=-18$.	CO4	L3	10M

UNIT-IV

8	From the following table values of x and y=tan x. Interpolate the values of y when x=0.12 and x=0.28.	CO5	L5	10M

X	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2027	0.2553	0.3093

OR

9	Obtain a second degree polynomial to the data by method of least square	CO5	L3	10M

X	1	2	3	4	5
Y	10	12	8	10	14

UNIT-V

10	Find the values of $y(0.1)$ *and* $y(0.2)$ by Picard's method given that $y^1=y-x^2$, $y(0)=1$.	CO6	L3	10M

OR

11	Using Runge – Kutta method of fourth order, find $y(0.1)$ *and* $y(0.2)$ given that $\frac{dy}{dx} = x + y$,$y(0)=1$.	CO6	L3	10M

***** END *****

O.P.Code: 23HS0832	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

NUMERICAL AND STATISTICAL METHODS

(Civil Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Write the formula to find root of an equation by Newton Raphson's method	CO1	L1	2M
	b	Solve by Jacoby method [Only two iterations] $x + y = 3\,; 3x - 2y = 4$	CO1	L2	2M
	c	Construct a forward difference table for the function $y = x^2$ for x = 0, 1, 2, 3	CO2	L2	2M
	d	State the two normal equation used in fitting a straight line	CO2	L1	2M
	e	State Euler formula to solve $y' = f(x,y),\ y(x_0) = y_0 at x = x_0 + h.$	CO3	L2	2M
	f	Find $y^{(1)}(x)$ by Picard's method, given that $\frac{dy}{dx} = 1 + xy\ ;\ y(0) = 1.$	CO3	L2	2M
	g	Define Population and size of population.	CO4	L1	2M
	h	Define point of estimator and interval estimator.	CO4	L1	2M
	i	Define Large sample	CO5	L1	2M
	j	Define level of significance.	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2		Find the root of the equation $x\,e^x = 2$ using Regula-falsi method	CO1	L2	10M

OR

3		Apply Gauss Siedel iteration method to solve the equations $\mathbf{20x + y - 2z = 17\,; 3x + 20y - z = -18; 2x - 3y + 20z = 25}$	CO1	L2	10M

UNIT-II

4		From the following table values of x and *y=tan x*. Interpolate the values of y when *x=0.12* and *x=0.28*.	CO2	L3	10M

x	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2027	0.2553	0.3093

OR

5		Obtain a second degree polynomial to the data by method of least square	CO2	L3	10M

X	1	2	3	4	5
Y	10	12	8	10	14

UNIT-III

6		Solve $y^1 = x + y$, given $y\,(1) = 0$ find $y(1.1)\ and y(1.2)$ by Taylor's series method.	CO3	L3	10M

OR

7		Using Runge – Kutta method of fourth order, solve $\frac{dy}{dx} = x^2 - y, y(0) = 1.$ Find $y(0.1)\ and y(0.2)$.	CO3	L3	10M

UNIT-IV

8	a	Explain procedure for testing a hypothesis.	CO4	L2	5M
	b	Explain characteristics of Estimators	CO4	L2	5M

OR

9	a	Experience had shown that 20% of a manufactured product is of top quality. In one day's production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 level.	CO4	L2	5M
	b	A sample of 400 items is taken from a population whose standard deviation is 10.The mean of the sample is 40. Test whether the sample has come from a population with mean 38.Also calculate 95% confidence interval for the population.	CO4	L2	5M

UNIT-V

10		Two random samples reveal the following results:	CO5	L4	10M

Sample	Size	Sample Mean	Sum of squares of deviations from the mean
1	10	15	90
2	12	14	108

Test whether the samples came from the same normal population.

OR

11	a	Samples of two types of electrical light blubs were tested for length of life and following data were obtained	CO5	L5	5M

	Type I	Type II
Sample numbers	8	7
Sample mean	1234 hrs	1036 hrs
Sample S.D	36 hrs	40 hrs

Is the difference in the means sufficient to warrant that type I is superior to type II regarding length of life.

	b	The number of automobile accidents per week in a certain community are as follows: 12, 8, 20, 2, 14, 10, 15, 6, 9, 4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period.	CO5	L5	5M

***** END *****

O.P.Code: 23HS0814	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

UNIVERSAL HUMAN VALUES-UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

(Common to All)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define the terms morality and empathy.	CO1	L1	2M
	b	Explain the term Natural Acceptance.	CO1	L2	2M
	c	Define the term Pre-Conditioning.	CO2	L1	2M
	d	Discuss activities of realization and understanding.	CO2	L2	2M
	e	Define the term Gratitude.	CO3	L1	2M
	f	Define the term Gratitude.	CO3	L1	2M
	g	What did you mean by conformance?	CO4	L1	2M
	h	Explain the understanding of harmony in nature.	CO4	L2	2M
	i	Define the term Professional Ethics.	CO5	L1	2M
	j	What is a Holistic Alternative?	CO5	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2	a	Write a short note on continuous happiness and prosperity in the current scenario.	CO1	L1	5M
	b	Explain the key features of professional excellence.	CO1	L2	5M
		OR			
3	a	Illustratethe differencebetweenempathyand sympathy.	CO1	L3	5M
	b	List out the benefits of empathy.	CO1	L1	5M

UNIT-II

4	a	Write down the factors influencing harmony in society and family.	CO2	L1	5M
	b	Give a brief note on moral autonomy. What are the skills required to improve moral autonomy?	CO2	L2	5M
		OR			
5	a	Outline the programme to ensure self-regulation and Health.	CO2	L2	5M
	b	How can we ensure harmony in self?	CO2	L2	5M

UNIT-III

6	a	Discuss briefly the outcome of identifying relationships based on exchanging physical facilities.	CO3	L2	5M
	b	Differentiate between intention and competence.	CO3	L1	5M
		OR			
7	a	Illustrate the term justice. How does it lead to mutual happiness?	CO3	L3	5M
	b	List out the programs needed to achieve the comprehensive human goal.	CO3	L1	5M

UNIT-IV

8	a	List out various components of harmony in nature.	CO4	L1	5M
	b	What do you mean by co-existence in nature?	CO4	L1	5M
		OR			
9	a	How can we say that 'nature is self-organized'?	CO4	L2	5M
	b	Explain the recyclability of any two units in nature with an example.	CO4	L2	5M

UNIT-V

10	a	What do you mean by 'universal human order'?	CO5	L1	5M
	b	Explain briefly the terms of innateness, self-organization, and self-expression.	CO5	L2	5M
		OR			
11	a	What do you mean by professional ethics?	CO5	L1	5M
	b	What do you mean by competence in professional ethics? Elaborate with examples.	CO5	L1	5M

***** END *****

O.P.Code: 23HS0835	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Supplementary Examinations August-2025
PROBABILITY AND COMPLEX VARIABLES
(Electronics & Communications Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A
(Answer all the Questions **10 x 2 = 20** Marks)

1	a	State Bayes' theorem.	CO1	L1	2M
	b	Define distribution function of a random variable?	CO1	L1	2M
	c	Define the moment generating function of a random variable.	CO2	L1	2M
	d	Define conditional density function of X given Y ?	CO2	L1	2M
	e	Variances $\sigma_X^2 = 6$ and $\sigma_Y^2 = 9$; correlation coefficient $\rho_{XY} = -2/3$ Find the covariance C_{XY}	CO3	L2	2M
	f	Write the joint pdf of jointly Gaussian random variable.	CO3	L1	2M
	g	Prove that $f(z) = \bar{z}$ is not an analytic at any point.	CO4	L2	2M
	h	Define harmonic function.	CO4	L1	2M
	i	Show that $\oint_C (z-a)^n dz = 0, (n, any\ integer \neq -1)$, where C is the circle $\lvert z-a\rvert = r$.	CO5	L2	2M
	j	Expand e^z as Taylor's series in powers of (z-3).	CO5	L2	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	The probability that students A,B,C,D solve the problem are $\frac{1}{3}$, $\frac{2}{5}$, $\frac{1}{5}$ and $\frac{1}{4}$ respectively if all of them try to solve the problem, what is the probability that the problem is solved.	CO1	L2	5M
	b	Two cards are drawn from a 52-card deck (the first is not replaced). (i) Given the first card is a queen, what is the probability that the second is also a queen? (ii) What is the probability that both cards will be a queen?	CO1	L2	5M
		OR			
3	a	If 2% of light bulbs are defective. Find the probability that (i) 2 defective items (ii) at least 3 defective items.	CO1	L2	5M
	b	In a certain Junior Olympics, a contestant throw distances are well approximated by a Gaussian distribution for which $a_X = 30m$. In a qualifying round, contestants must throw farther than $26m$ to qualify. In the main event the record throw is $42m$. (i) What is the probability of being disqualified in the qualifying round? (ii) In the main event what is the probability the record will be broken?	CO1	L3	5M

UNIT-II

4		Show that the mean value and variance of the random variable having the uniform density function are: $\overline{X} = E(X) = \frac{b+a}{2}$ and $\sigma_X^2 = \frac{(b-a)^2}{12}$	CO2	L4	10M
		OR			
5		Given the function $f_{X,Y}(x,y) = b(x+y)^2$; $-2 < x < 2$ *and* $-3 < y < 3$ (i) Find the constant 'b' such that this is a valid joint density function. (ii) Determine the marginal density functions $f_X(x)$ and $f_Y(y)$.	CO2	L4	10M

(iii) Are X and Y statistically independent?

UNIT-III

6		Random variables X and Y have the joint density $f_{X,Y}(x,y)=\frac{(x+y)^2}{40}$; $-1<x<1$ *and* $-3<y<3$. (i) Find all the second-order moments of X and Y (ii) What are the variances of X and Y? (iii) What is the Co-variance of X and Y?	CO3	L4	10M
		OR			
7		Two random variables X and Y have means 1 and 2 respectively and variance 4 and 1 respectively. Their correlation coefficient is 0.4.new the random variable W and V are defined as V= -X+2Y; W=X+3Y. Find the (i) Means (ii)variance (iii) correlations (iv) correlation coefficient of V and W	CO3	L3	10M

UNIT-IV

8	a	Verify the function $f(z) = 2xy + i(x^2 - y^2)$ is analytic or not?	CO4	L2	5M
	b	Determine p such that the function $f(z)=\frac{1}{2}\ln(x^2+y^2)-i\tan^{-1}\frac{px}{y}$ be an analytic function.	CO4	L2	5M
		OR			
9	a	Find the analytic function whose imaginary part is $e^{-x}(x\cos y + y\sin y)$.	CO4	L3	5M
	b	If $f(z)$ is a regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial x^2}\right)\lvert f(z)\rvert^2 = 4\lvert f'(z)\rvert^2$	CO4	L3	5M

UNIT-V

10	a	Evaluate $\int_0^{2+i}(\bar{z})^2\,dz$, along the real axis to 2 and vertically to $2+i$.	CO5	L2	5M
	b	Evaluate $\oint_C \frac{e^z}{(z-1)(z-4)}dz$, where C is the circle $\lvert z\rvert = 2$ by using Cauchy's integral formula.	CO5	L3	5M
		OR			
11	a	Expand the function $f(z)=\sin z$ in Tayler's expansion of in powers of $(z-\frac{\pi}{4})$.	CO5	L2	5M
	b	Evaluate $\int_0^{2\pi}\frac{d\theta}{2+\cos\theta}$ using Cauchy's residue theorem.	CO5	L3	5M

***** END *****

O.P.Code: 23CS0508	R23	H.T.No.										

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Supplementary Examinations August-2025
OBJECT OREINTED PROGRAMING THROUGH JAVA
(Common to CSIT, CSE, CSM, CIC, CAD, CCC & CAI)

Time: 3 Hours **Max. Marks: 70**

PART-A
(Answer all the Questions **10 x 2 = 20** Marks)

1	a	List out Java language BUZZWORDS.	CO1	L1	2M
	b	Define variables. List out different types of variables.	CO1	L1	2M
	c	List Access Specifiers in java.	CO2	L1	2M
	d	What is the use of "this" Keyword?	CO2	L1	2M
	e	What is the use of Interface?	CO3	L1	2M
	f	How to declare an array in Java?	CO3	L1	2M
	g	What is a package? How to define a package?	CO4	L1	2M
	h	What is an uncaught exception?	CO4	L1	2M
	i	What is difference between starting thread with Run () and start () method?	CO5	L1	2M
	j	List out JDBC Product Components.	CO5	L1	2M

PART-B
(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2	a	Explain the step-by-step process for creating, compiling & running java program using JVM.	CO1	L2	5M
	b	List and explain types of java statements	CO1	L1	5M
		OR			
3	a	List out the selection statements available in Java. Explain with an example.	CO1	L1	5M
	b	Develop a java program to design calculator with basic operations using switch.	CO1	L5	5M

UNIT-II

4	a	Create a java program to display "Hello! Java" using Class, Object and Method.	CO2	L4	5M
	b	Create a class object as parameter in method.	CO2	L6	5M
		OR			
5	a	Define constructor. Classify the types of constructors in Java.	CO2	L3	5M
	b	Create a java program for pass by Reference.	CO2	L1	5M

UNIT-III

6	a	Differentiate between method overriding and dynamic method dispatch.	CO3	L3	5M
	b	Categorize the different types in annotations.	CO3	L4	5M
		OR			
7	a	What is an abstract class? Explain all the cases to implement abstract class.	CO3	L2	6M
	b	Identify a storage of array in computer memory.	CO3	L3	4M

UNIT-IV

8	a	List and explain File handling functions using File class.	CO4	L1	6M
	b	Differentiate Checked Exception and Unchecked Exception.	CO4	L3	4M
		OR			
9	a	Illustrate Wrapper classes in java and its advantages.	CO4	L2	5M
	b	Identify the use of throw,throws and throwable clause with examples.	CO4	L4	5M

UNIT-V

10	a	What is Multithreading? Illustrate the ways to create multiple threads in java.	CO5	L1	5M
	b	Discuss about JDBC architecture and explain in detail.	CO5	L6	5M
		OR			
11	a	Define JDBC. Explain importance of JDBC.	CO5	L2	5M
	b	Explain about various scene graph and mouse events with example.	CO5	L5	5M

***** END *****

O.P.Code:23CE0107	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

FLUID MECHANICS

(Civil Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define the term Specific weight.	CO1	L1	2M
	b	Define viscosity.	CO1	L1	2M
	c	State Pascal's law.	CO2	L1	2M
	d	What is Centre of buoyancy?	CO2	L1	2M
	e	Define stream line.	CO3	L1	2M
	f	List the types of fluid flows.	CO3	L1	2M
	g	Define Reynolds number.	CO4	L1	2M
	h	What is the principle of pitot tube?	CO5	L1	2M
	i	Write the Chezy's formula.	CO4	L1	2M
	j	Define hydraulic gradient line.	CO6	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid.	CO1	L2	5M
	b	When the pressure of liquid is increased from 3.5 MN/m2 to 6.5 MN/m2 its volume is found to decrease by 0.08 percent. Calculate the bulk modulus of elasticity of the liquid?	CO1	L3	5M
		OR			
3		The space b/w two square parallel plates filled with oil. Each side of the plate is 60 cm. The thickness of oil film is 12.5. The upper plate which moves at 2.5m/sec requires a force 98.1 N to maintain the speed. Determine the i) Dynamic viscosity of oil in poise. ii) Kinetic viscosity of the oil in stokes, If the specific gravity of the oil 0.95.	CO1	L3	10M

UNIT-II

4	a	Explain briefly the working principle of U-Tube differential manometer with a neat sketch.	CO2	L2	5M
	b	Explain the pressure variation with temperature, density and altitude.	CO2	L2	5M
		OR			
5	a	Derive the expression for Center of Pressure of vertical plane surface.	CO2	L3	5M
	b	Explain briefly the pressure gauges.	CO2	L2	5M

UNIT-III

6		Obtain an expression for continuity equation for a three - dimensional flow.	CO4	L3	10M
		OR			
7	a	Define stream line, streak line and path line, stream tube	CO3	L1	5M
	b	The velocity potential function is given by $\emptyset = 5(x^2 - y^2)$. Calculate the velocity components at the point (4, 5).	CO3	L3	5M

UNIT-IV

8	a	Explain Pitot tube with neat sketch.	CO3	L2	5M
	b	An oil of Sg=0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat dia 10cm . The oil – Hg differential manometer shows a reading of 25 cm . Calculate discharge of oil through horizontal venturimeter. Take Cd = 0.98.	CO3	L3	5M

OR

9	a	State the momentum equation.How will you apply momentum equation for determining the force exerted by a flowing liquid on a pipe bend?	CO4	L2	6M
	b	The water is flowing through a pipe having diameter of 20 cm and 10 cm at section 1 & 2 respectively. The rate of flow through pipe is 35 lit/sec. The section 1 is 6m above the datum and section 2 is 4m above the datum. If the pressure at the section 1 is 39.24 N/cm^2. Calculate the intensity of pressure at the section 2.	CO5	L3	4M

UNIT-V

10		Derive the expression for head loss in pipes due to friction by Darcy - Weisbach equation and chezy's formula.	CO6	L3	10M

OR

11	a	Derive the expression for flow through parallel pipes.	CO6	L3	5M
	b	Three pipes of lengths 800m, 500m & 400m & of dia 500mm, 400mm & 300mm respectively are connected in series. These pipes are replaced by a single pipe of length 1700m. Calculate the dia of the single pipe?	CO6	L3	5M

***** END *****

O.P.Code: 23EE0209	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

DC MACHINES AND TRANSFORMERS

(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define commutation.	CO1	L1	2M
	b	State the effects of armature reaction in DC machine.	CO1	L2	2M
	c	List the various speed control methods of DC shunt motors.	CO2	L1	2M
	d	What is the significance of back emf?	CO2	L1	2M
	e	Draw the typical equivalent circuit of a single-phase transformer.	CO3	L2	2M
	f	Define all day efficiency of a transformer.	CO3	L1	2M
	g	What is Sumpner's test?	CO5	L1	2M
	h	Specify the applications of autotransformer.	CO6	L2	2M
	i	What are the various types of three phase transformer connections?	CO5	L1	2M
	j	Mention the applications of Scott connection.	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2		A 75 kW, 500V, DC shunt motor has 4-poles and wave connected armature winding with 492 conductors. The flux per pole is 0.04Wb and the full load efficiency is 91%. The armature and commutating pole windings have a total resistance of 0.08? and the shunt field resistance is 200?. Calculate for full load 1) The speed, 2) Useful torque delivered to the load and 3) The torque developed.	CO1	L4	10M
		OR			
3		Explain the process of commutation of DC generator with neat sketches.	CO1	L2	10M

UNIT-II

4		What is the necessity of starter? Draw the diagram of a 3point starter and Explain.	CO2	L4	10M
		OR			
5		Explain the Hopkinson's test for determining efficiency of two similar DC shunt machines.	CO2	L2	10M

UNIT-III

6	a	Draw and explain the No-load phasor diagram of 1ϕ transformer	CO3	L4	5M
	b	Draw and explain the phasor diagram of transformer when it is operating under load.	CO3	L4	5M
		OR			
7	a	Why is the rating of transformer given in KVA? List out the applications of transformer.	CO4	L2	4M
	b	A transformer with normal voltage impressed as a flux density of 1.2T and a core loss consisting of 1200W eddy current losses and 3500W hysteresis losses. What do these values become under the following conditions. (i) Increasing the applied voltage by 5% at rated frequency. (ii) Reducing the frequency by 5% with normal voltage impressed. (iii) Increasing both impressed voltage and frequency by 5%	CO4	L2	6M

UNIT-IV

8		Deduce an expression for the load shared by the two transformers with unequal voltage ratios.	CO4	L4	10M

OR

9	a	Explain in detail about separation of hysteresis and eddy current losses in a transformer.	CO4	L4	5M
	b	The total core loss of a specimen of silicon steel is found to be 1500W at 50Hz. Keeping the flux density constant, the loss becomes 3000W. When the frequency is raised to 75Hz, calculate separately the hysteresis and eddy current losses at each of those frequencies.	CO4	L4	5M

UNIT-V

10		Explain in detail about open–delta connection and write the advantages, disadvantages and uses of open delta connection	CO5	L2	10M

OR

11		A 50Hz Scott-connected transformer supplied an unbalanced 2-phase load at 200V per phase. For the leading phase (phase "A") the load has a resistance of 10ohms and an inductance of 42.3mH. For the other phase, the load consists of a resistor of 13.3 ohms and a capacitor of 318 microfarads in series. Neglecting the magnetizing current and the internal impedance of the transformer, calculate the line currents on the 3-phase side. The main transformer primary/secondary turns ratio is 12/1.	CO5	L4	10M

***** END *****

O.P.Code: 23CS0507	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Supplementary Examinations August-2025
ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS
(Common to CSE, CIC, CCC, CAI, CSM & CAD)

Time: 3 Hours **Max. Marks: 70**

PART-A
(Answer all the Questions **10 x 2 = 20** Marks)

1	a	What do you mean by algorithm? List some of the properties of it.	CO1	L2	2M
	b	Define Balance Factor.	CO1	L1	2M
	c	What is Articulation point?	CO2	L1	2M
	d	Write the applications of Heap tree.	CO2	L3	2M
	e	Differentiate greedy and dynamic programming.	CO3	L2	2M
	f	What is 0/1 knapsack problem.	CO3	L1	2M
	g	Define Backtracking.	CO4	L1	2M
	h	What is Branch and Bound?	CO4	L1	2M
	i	Define P class and NP Class.	CO5	L1	2M
	j	What is deterministic algorithm?	CO5	L1	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2		Discuss briefly with suitable example about Big 'O' notation and Theta notation 'Θ'.	CO1	L2	10M

OR

3	a	Write the applications and Operations of the B-Tree.	CO1	L3	5M
	b	Elaborate the B-Tree Deletion Operation with suitable example.	CO1	L3	5M

UNIT-II

4		Analyze the working strategy of merge sort and illustrate the process of Merge Sort algorithm for the given data: 43, 32, 22, 78, 63, 57, 91 and 13.	CO2	L4	10M

OR

5	a	Explain about Convex Hull with example.	CO2	L2	5M
	b	Explain the General Method of Divide and Conquer Method.	CO2	L2	5M

UNIT-III

6		Elaborate job sequencing with deadlines by using greedy method where given the jobs, their deadlines and associated profits as shown below.Calculate maximum earned profit.	CO3	L6	10M

Jobs	J1	J2	J3	J4	J5	J6
Deadlines	5	3	3	2	4	2
Profits	200	180	190	300	120	100

OR

7	a	Discuss about Optimal binary search tree with suitable example.	CO3	L2	5M
	b	Build any one application of dynamic programming with an example.	CO3	L6	5M

UNIT-IV

8	Construct the State space tree for the profits={3,5,6,10} and weights={2,3,4,5},n=4 and m=8 (Capacity). Apply the backtracking for 0/1 Knapsack and also find the Maximum profit.		CO4	L4	10M
	OR				
9	**a**	Describe the general method of branch and bound.	CO4	L1	5M
	b	Explain the role of the state-space tree in branch and bound techniques.	CO4	L4	5M

UNIT-V

10	Build the non-deterministic sorting algorithm and also analyze its complexity.		CO5	L6	10M
	OR				
11	**a**	Explain why Clique Decision Problem is NP-Hard. Explain.	CO5	L3	5M
	b	Explain why Traveling Salesperson Decision Problem is NP-Hard. Explain.	CO5	L4	5M

***** END *****

O.P.Code: 23CI0601	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

DATA STRUCTURES & ALGORITHMS

(Computer Science & Information Technology)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	What is an AVL tree? Give one example.	CO1	L2	2M
	b	What is B-Tree? Give one example.	CO1	L1	2M
	c	What is directed and undirected graph?	CO2	L2	2M
	d	Construct Strassen's 2×2 matrix.	CO2	L1	2M
	e	What is Spanning Tree?	CO3	L2	2M
	f	Write the dynamic programming.	CO3	L1	2M
	g	What is Branch and Bound?	CO4	L2	2M
	h	State the Container problem.	CO4	L1	2M
	i	Define P class and NP Class.	CO5	L2	2M
	j	What is Chromatic Number?	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Discuss factors affecting the time complexity	CO1	L3	5M
	b	Compare between Priori analysis and Posteriori analysis.	CO1	L2	5M
		OR			
3	a	Explain different AVL rotations with suitable examples.	CO1	L2	5M
	b	Write the applications and operations of an AVL tree.	CO1	L4	5M

UNIT-II

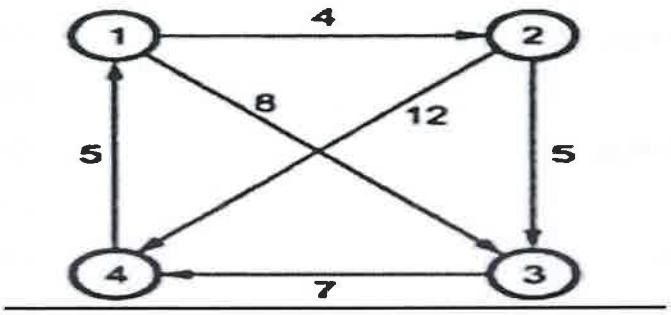
4	a	Construct Max Heap Tree for the following elements 32, 15, 20, 30, 12, 25, 16.	CO2	L2	5M
	b	Sort the records with the following index values in the ascending order using Quick Sort algorithm, 10,80,30,90,40,50 and 60.	CO2	L3	5M
		OR			
5	a	Explain the General Method of Divide and Conquer Method.	CO2	L2	5M
	b	Discuss about Convex Hull with example.	CO2	L4	5M

UNIT-III

6	Construct an optimal solution for Knapsack problem, where n=7,M=15 and (p1,p2,p3,p4,p5,p6,p7) = (10,5,15,7,6,18,3) and (w1,w2,w3,w4,w5,w6,w7) = (2,3,5,7,1,4,1) by using Greedy strategy.	CO3	L2	10M

OR

7	Construct an algorithm for All pairs of shortest path and calculate shortest path between all pairs of vertices by using dynamic programming method for the following graph.	CO3	L2	10M



UNIT-IV

8	Compare Back Tracking and Branch and Bound methods by taking an example.	CO4	L2	10M

OR

9	Construct the State space tree for the profits={3,5,6,10} and weights={2,3,4,5},n=4 and m=8 (Capacity). Apply the backtracking for 0/1 Knapsack and also find the Maximum profit.	CO4	L2	10M

UNIT-V

10		Explain why Clique Decision Problem is NP-hard with suitable an example.	CO5	L2	10M

OR

11	a	Discuss about Chromatic Number Decision Problem in detail.	CO5	L2	5M
	b	Describe Job Shop Scheduling in NP Hard Scheduling Problem.	CO5	L4	5M

***** END *****

O.P.Code:23CE0106	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

Strength of Materials

(Civil Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define Stress and give its units. What are different types of stress?	CO1	L1	2M
	b	Define the terms the terms: (i) Modulus of elasticity (iii) Bulk modulus.	CO1	L1	2M
	c	Define beam? What are the different types of beams?	CO2	L1	2M
	d	Define the terms shear force and bending moment.	CO2	L1	2M
	e	Define the terms Bending stress and section modulus.	CO3	L1	2M
	f	What are the assumptions made in theory of simple bending?	CO3	L1	2M
	g	What is deflection of beam? What are the causes of deflection in beams?	CO4	L1	2M
	h	What are the methods for finding out the slope and deflection at a section?	CO4	L1	2M
	i	Define the terms Column, Strut and Crippling load.	CO5	L1	2M
	j	What are the different types of end Conditions of Columns?	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

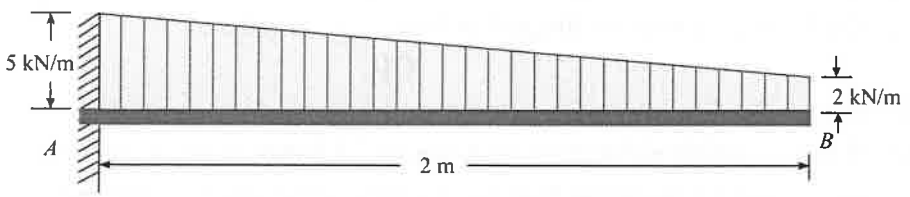
2	Draw Stress – Strain graph for mild steel bar subjected to tensile loading and mark salient points on the graph.	CO1	L3	10 M

OR

3	A hollow cast iron cylinder 4 m long, 300 mm outer diameter, and thickness of metal 50 mm is subjected to a central load on the top when standing straight. The stress produced is $75x10^3$ kN/m^2. Assume Young's Modulus for cast iron as $1.5x10^8$ kN/m^2 and find (i) magnitude of load (ii) longitudinal strain produced, and (iii) total decrease in length.	CO1	L4	10M

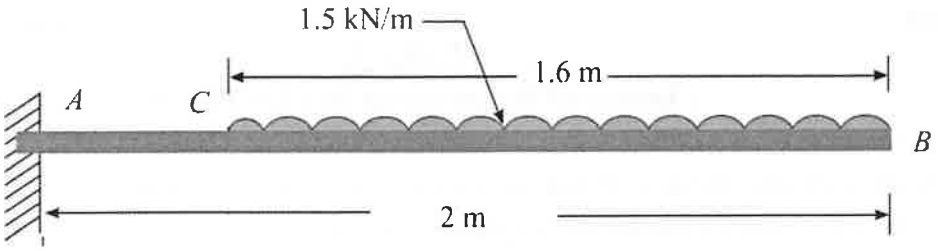
UNIT-II

4	a	Define shear force and bending moment.	CO2	L1	5M
	b	A cantilever beam of 2 m span is subjected to a gradually varying load from 2kN/m to 5 kN/m as shown in figure. Draw the shear force and bending moment diagrams for the beam.	CO2	L4	5M



OR

5	a	List and explain different types of beams based on support conditions.	CO2	L1	5M
	b	A cantilever beam AB, 2 m long carries a uniformly distributed load of 1.5 kN/m over a length of 1.6 m from the free end. Draw shear force and bending moment diagrams for the beam.	CO2	L4	5M



UNIT-III

6	A timber beam of rectangular section supports a load of 20kN uniformly distributed over a span of 3.6 m. If depth of the beam section is twice the width and maximum stress is not to exceed 7 MPa, find the dimensions of the beam section.	CO3	L4	10M

OR

7	A cast iron water pipe of 500 mm inside diameter and 20 mm thick is supported over a span of 10 m. Find the maximum stress in the pipe metal, when the pipe is running full. Take density of cast iron as 70.6 kN/m^3 and that of water as 9.8 kN/m^3.	CO3	L4	10M

UNIT-IV

8	Using double integration method determine the maximum slope and deflection for a simply supported beam subjected to uniformly distributed load throughout the length of the beam.	CO4	L3	10M

OR

9	A timber beam of rectangular section has a span of 4.8 m and is simply supported at its ends. It is required to carry a total load of 45 kN uniformly distributed over the whole span. Find the value of the breadth (b) and depth (d) of the beam, if maximum bending stress is not to exceed 7 Mpa and maximum deflection is limited to 9.5 mm. Take E for the timber as 10.5 GPa.	CO4	L4	10M

UNIT-V

10	a	What are the assumptions made in Euler's theory?	CO5	L1	5M
	b	Find the ratio of buckling strength of a solid column to that of a hollow column of the same material and having the same cross –sectional area. The internal diameter of the hollow column is half of its external diameter. Both the columns are hinged and the same length.	CO5	L3	5M

OR

11	A hollow alloy tube 4 m long with external and internal diameters of 40 mm and 25 mm respectively was found to extend 4.8 mm under a tensile load of 60 kN. Find the buckling load for the tube with both ends pinned. Also find the safe load on the tube, taking a factor of safety as 5.	CO5	L4	10M

***** END *****

O.P.Code: 23EC0402	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

ELECTRONIC DEVICES AND CIRCUITS

(Electronics & Communications Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define efficiency of a rectifier.	CO4	L2	2M
	b	List the applications of clampers.	CO4	L1	2M
	c	List the types of BJT and operating regions.	CO1	L1	2M
	d	Discuss the need of biasing.	CO4	L6	2M
	e	List out the characteristics of CE amplifier	CO2	L1	2M
	f	How is r_π (input resistance) calculated in the hybrid-π model?	CO3	L1	2M
	g	State the application of JFET	CO2	L1	2M
	h	Classify the types of JFET with its symbols.	CO2	L3	2M
	i	Define Transconductance.	CO5	L1	2M
	j	Draw an alternative representation of the T model.	CO5	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

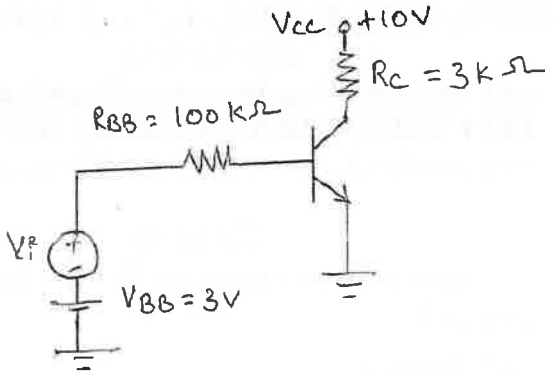
2	a	Compare Half Wave, Full Wave and Bridge Wave rectifiers.	CO4	L4	5M
	b	A Half Wave Rectifier is supplied from a 230V, 50 Hz supply with a step-down ratio of 3:1 to a resistive load of 10kΩ. The diode forward resistance is 75Ω while transformer secondary is 10Ω. Calculate maximum, average, RMS values of current, DC output voltage, efficiency of rectification.	CO3	L4	5M
		OR			
3	a	Compare the characteristics of LCD with LED.	CO1	L4	3M
	b	With basic structure, symbol and equivalent circuit explain working of UJT and draw characteristics.	CO2	L2	7M

UNIT-II

4	a	With neat circuit diagram, explain the Input and Output characteristics of a BJT in CB Configuration.	CO4	L5	5M
	b	Discuss Thermal Runaway and Thermal Resistance.	CO2	L6	5M
		OR			
5	a	Explain self-bias of a Transistor with neat circuit diagram.	CO2	L2	5M
	b	Consider the self-bias circuit where Vcc = 22.5 volts, Rc =5.6kΩ, R2 = 10kΩ and R1 = 90kΩ, hfe = 55, V_{BE} =0.6V. the transistor operates in active region. Determine i) Operating point ii) stability factor.	CO3	L3	5M

UNIT-III

6	a	Explain the thermal voltage VT and how does it affect the small-signal model?	CO1	L2	5M
	b	Evaluate a voltage gain for transistor amplifier as shown in figure, assume β =100.	CO2	L5	5M



OR

7	a	Discuss about separating the signal and the DC quantities with suitable diagrams.	CO4	L6	6M
	b	Design the small-signal, common-collector amplifier with equivalent circuit.	CO2	L6	4M

UNIT-IV

8	a	Explain the construction & operation of an enhancement type NMOS Transistor.	CO2	L2	6M
	b	Consider a process technology for which L_{min} = 0.4 μm, tox = 8 nm, μ_n = 450 cm²/V-s, and Vt=0.7 V. (i) Calculate C_{ox} and k'_n (ii) For a MOSFET with W/L = 8 μm/0.8 μm, calculate the values of V_{GS} and V_{DSmin} needed to operate the transistor in the saturation region with a de current I_D = 100 μA. (iii) For the device in (ii), calculate the value of V_{GS} required to cause the device to operate as a 1000-Ω resistor for very small V_{DS}	CO3	L4	4M

OR

9	a	Discuss the characteristic parameters of the JFET and show the relation among the JFET parameters μ, rd and gm.	CO3	L6	8M
	b	What is modeling of Body Effect?	CO2	L1	2M

UNIT-V

10	a	Compare the various parameters of CS, CG & CD amplifiers.	CO6	L4	5M
	b	A MOSFET is to operate at I_D = 0.1 mA and is to have g_m = 1 mA/ V. If K'_n = 50 μ A/V^2 , Compute the required W/L ratio and the over drive voltage.	CO3	L3	5M

OR

11	a	Illustrate the MOSFET Transconductance gm with graphical construction.	CO5	L3	5M
	b	Evaluate the overall voltage gain of the Common-Source Amplifier without a Source Resistance with suitable circuits.	CO5	L5	5M

***** END *****

O.P.Code:23EE0208	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

ELECTRICAL CIRCUIT ANALYSIS-II

(Electrical & Electronics Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

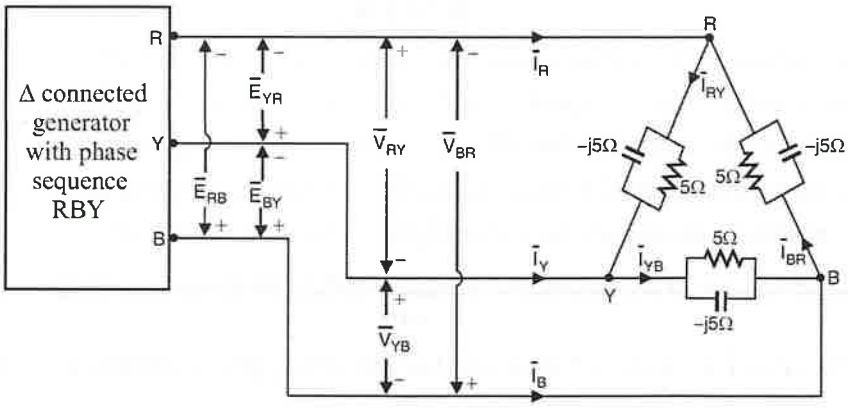
1	a	A balanced load of (8+j6) Ω/ph is connected in delta across 3-Φ, 400V, 50Hz supply. Find the line current.	CO1	L3	2M
	b	What is phase sequence? Distinguish between unbalanced source and unbalanced load.	CO1	L2	2M
	c	What is the time constant of an RC circuit?	CO2	L1	2M
	d	Determine the Laplace transform of unity, that is, f (t) = 1.	CO2	L2	2M
	e	How will you find the π-equivalent of a given network when its y-parameters are known?	CO3	L1	2M
	f	What are the open-circuit impedance parameters of a two-port network?	CO3	L1	2M
	g	Determine the Fourier coefficients.	CO4	L1	2M
	h	What are the conditions which a periodic function must satisfy to have its Fourier series expansion?	CO4	L1	2M
	i	A band-pass filter has a resonant frequency of 950 Hz and a bandwidth of 2700 Hz. Find its lower and upper cut-off frequencies.	CO5	L2	2M
	j	Draw constant-k low pass filter and high pass filter.	CO5	L3	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2		A delta-connected generator with phase sequence of RBY is connected to a delta connected load with phase sequence RYB as shown in Fig. 1. Determine the voltages of generator and load by taking $V_{RY}=120\angle 0^\circ$ V. Also calculate the phase and line currents of the load.	CO1	L3	10M



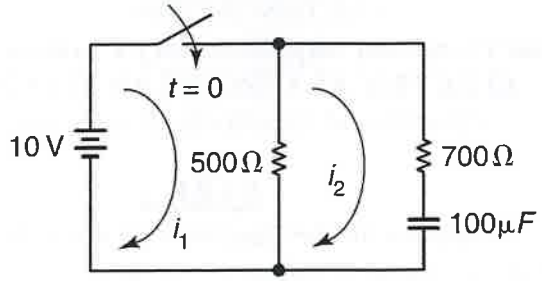
OR

3		Discuss in detail the three phase 4-wire circuits with star connected balanced loads and power consumed by a balanced star-connected load.	CO1	L2	10M

UNIT-II

4	a	For the circuit shown in figure, find an expression for the current supplied by the source. How much time it will take for the current to reach 25 mA?	CO2	L3	10M

Assume the circuit to be initially relaxed.



OR

5	Define Laplace transform of standard function and find Laplace transform of standard function for the following. i. Evaluate $L[3e^{-5t} + 8\cos 3t + 2\sinh 2t - 5t^3]$ ii. Evaluate L[sin 2t cos 3t]	CO2	L3	10M

UNIT-III

6	Define z and y parameters of a typical four-terminal network. Determine the relationship between the z and y parameters	CO3	L2	10M

OR

7	**a** Develop an equation for Hybrid Parameters (h-Parameters) and Inverse Hybrid Parameters (g-Parameters).	CO3	L2	5M
	b Two two-port networks are connected in cascade. Prove that the overall transmission parameter matrix is the product of individual transmission parameter matrices.	CO3	L4	5M

UNIT-IV

8	Stipulate the complex Fourier series for periodic waveform.	CO4	L4	10M

OR

9	Calculate the impedance consisting of R and L and the power factor of a circuit whose expression for voltage and current are v(t)=250 sin 314t + 50 sin (942t + 30∘)(V), i(t)=17.7sin(314t - 45∘)+1.583sin(942t - 41.6∘)(A)	CO4	L3	10M

UNIT-V

10	A series-resonant band stop filter consist of a series resistance of $2k\Omega$ across which is connected a series-resonant circuit consisting of a coil of resistance 10Ω and inductance 350 mH and a capacitor of capacitance 181 pF. F if the applied signal voltage is $10\angle 0°$ of variable frequency, calculate (a) resonant frequency f_0; (b) half-power bandwidth B_{hp}; (c) edge frequencies f_1 and f_2; (d) output voltage at frequencies f_0, f_1 and f_2.	CO5	L3	10M

OR

11	**a** Design the low pass RL filter and illustrate the frequency-phase response curve.	CO5	L1	5M
	b Explain in the detail with neat illustration of bandpass Filter network.	CO5	L1	5M

***** END *****

O.P.Code:23ME0304	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

MECHANICS OF SOLIDS

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	State Hook's law.	CO1	L2	2M
	b	Define Factor of safety.	CO1	L1	2M
	c	Classify the types of beams.	CO2	L1	2M
	d	State point of contra flexure.	CO2	L2	2M
	e	Write the assumptions of simple bending.	CO3	L2	2M
	f	Draw the shear stress distribution in solid circular shaft.	CO3	L2	2M
	g	State Maculays method.	CO4	L2	2M
	h	What are the assumptions made in Torsion equation.	CO4	L2	2M
	i	State circumferential stress (or) hoop stress.	CO5	L2	2M
	j	Write limitations of rankines formula.	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

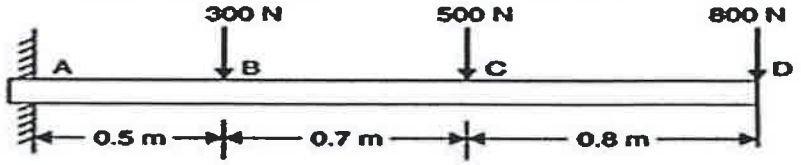
2	a	A rod 150 cm long and of diameter 2.0 cm is subjected to an axial pull of 20 kN. If the modulus of elasticity of the material of the rod is 2 x 10^5 N/mm^2 determine :(i) stress,(ii) strain, and: (iii) elongation of the rod	CO1	L3	5M
	b	Find the Young's Modulus of a brass rod of diameter 25 mm and of length 250 mm. which is subjected to a tensile load of 50 kN when the extension of the rod is equal to 0.3 mm.	CO1	L3	5M

OR

3	a	Define and Derive Mohr's circle with neat sketch	CO1	L2	5M
	b	The tensile stresses at a point across two mutually perpendicular planes are 120 N/mm^2 and 60 N/mm^2. Determine the normal, tangential and resultant stresses on a plane inclined at 30° to the axis of minor stress using Mohr's circle.	CO1	L3	5M

UNIT-II

4		A cantilever beam of length 2m carries the point loads as shown in Fig. Draw the SFD and BMD for the given beam.	CO2	L3	10M



OR

5		A simply supported beam of length 5M ,carries point load of 3 kN and 6 Kn at distance of 2m and 4m from the left end . Draw the shear force and bending moment for the beam.	CO2	L3	10M

UNIT-III

6	A square beam 20 mm x 20 mm in section and 2 m long is supported at the ends. The beam fails when a point load of 400 N is applied at the centre of the beam. What uniformly distributed load per metre length will break a cantilever of the same material 40 mm wide, 60 mm deep and 3 m long.	CO3	L3	10M
	OR			
7	A beam of triangular cross-section is subjected to a sheer force of 50 kN. The base width of the section is 250mm and height 200mm . The beam is placed with its base horizontally. Find the maximum shear stress and the shear stress at the N.A.	CO3	L3	10M

UNIT-IV

8	beam of uniform rectangular section 200 mm wide and 300 mm deep is simply supported at its ends. It carries a uniformly distributed load of 9 KN/m run over the entire span of 5 m. If the value of E for the beammaterial is 1 x 10^4 N/mm^2, find:(i) The slope at the supports and (ii) Maximum deflection.	CO4	L3	10M
	OR			
9	A solid circular shaft transmits 75 kW power at 200 r.p.m. Calculate the shaft diameter, if the twist in the shaft is not to exceed 1° in 2 metres length of shaft, and shear stress is limited to 50 N/mm^2 . Take C = 1 x 10s N/mm^2	CO4	L3	10M

UNIT-V

10	A cylindrical shell 90 cm long 20 cm internal diameter having thickness of metal as 8 mm is filled with fluid at atmospheric pressure. If an additional 20 cm3 of fluid is pumped into the cylinder, find (i) the pressure exerted by the fluid on the cylinder and (ii) the hoop stress induced. Take E = 2 x 10s N/mm2 and μ = 0.3.	CO5	L3	10M
	OR			
11	A column of timber section 15 cm x 20 cm is 6 metre long both ends being fixed. If the Young's modulus for timber =17.5 KN/mm^2, determine: (i) Crippling load and (ii) Safe load for the column if factor of safety = 3.	CO5	L3	10M

***** END *****

O.P.Code: 23CE0105	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Supplementary Examinations August-2025
SURVEYING
(Civil Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A
(Answer all the Questions **10 x 2 = 20** Marks)

1	a	List any four accessories in surveying.	CO1	L1	**2M**
	b	Mention the various types of tape.	CO1	L1	**2M**
	c	Define Levelling.	CO2	L1	**2M**
	d	Make a note on Simpson's one third rule.	CO2	L1	**2M**
	e	Define centering.	CO3	L1	**2M**
	f	Differentiate between face left and face right observation.	CO3	L2	**2M**
	g	Define tangent length of a curve.	CO5	L1	**2M**
	h	Write short note on infrared type of EDM instrument.	CO5	L1	**2M**
	i	What do you mean by nadir point?	CO6	L1	**2M**
	j	Make a note on Isocentre.	CO6	L1	**2M**

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Briefly explain about the primary divisions of surveying.	CO1	L2	**5M**
	b	Mention the objectives of surveying.	CO1	L1	**5M**

OR

3		Explain the prismatic compass by indicating their parts, With neat sketch.	CO1	L2	**10M**

UNIT-II

4		The following staff readings were observed successively with level, the instrument has been moved forward after the second, fourth and eighth readings: 0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030 and 3.765. The first reading was taken with the staff held upon a benchmark of elevation 132.135m. Enter the readings in level book-form and reduce the levels. Apply the usual checks. Find also the difference in level between the first and the last points.	CO2	L4	**10M**

OR

5		Define contour. State the various characteristics of contour lines.	CO2	L1	**10M**

UNIT-III

6		Determine the R.L of the top of a temple from the following data. Station A and B are in line with the top of the temple.	CO3	L3	**10M**

Inst Station	Reading on BM(m)	Vertical Angle	R.L of BM
A	1.085	10°48′	R.L of BM = 150.000m
B	1.265	7°12′	AB=50 m

OR

7	a	Write short notes on methods of adjusting the traverse.	CO4	L1	**5M**
	b	Briefly explain the Bowditch's method of adjusting the traverse.	CO4	L2	**5M**

UNIT-IV

8		Two tangents intersect at chainage 1250 m. The angle of intersection is 150°.Calculate all data necessary for setting out a curve of radius 250 m by the deflection angle method. The peg intervals may be taken as 20 m. Prepare a setting out table when the least count of the vernier is 20". Calculate the data for field checking.	CO5	L2	**10M**

OR

9	Briefly explain the types of EDM instrument.	CO5	L2	**10M**

UNIT-V

10	Brief explain with sketch the relief and tilt displacements.	CO6	L2	**10M**

OR

11	Explain in detail about stereoscopy in photogrammetric surveying.	CO6	L2	**10M**

***** END *****

O.P.Code:23EC0401	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

SIGNALS, SYSTEM AND STOCHASTIC PROCESSES

(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Discuss about causal and non-causal, Time invariant and time variant systems.	CO1	L2	**2M**
	b	List any two properties of Fourier Series.	CO2	L1	**2M**
	c	Find the fourier transform of e^{-at} u(t)	CO2	L3	**2M**
	d	State the properties of ROC of Laplace Transform.	CO2	L1	**2M**
	e	What is impulse response.	CO4	L1	**2M**
	f	Explain about Paley-Wiener criterion.	C04	L2	**2M**
	g	Differentiate between Random Processes and Random variables with example.	CO5	L4	**2M**
	h	How two random processes X(t)& Y(t) are said to be independent.	CO5	L2	**2M**
	i	Define Power Spectrum Density.	CO2	L1	**2M**
	j	List any two properties of Power Spectrum Density.	CO2	L1	**2M**

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Define energy and power signals. Find the signal $x(t)= e^{-2t} u(t)$ is a power signal or energy signal.	CO1	L3	**5 M**
	b	Discuss the following. (i) Even and Odd signals (ii) Periodic and Non-Periodic Signals.	CO1	L2	**5M**

OR

3	a	Find the odd and even components of the signal x(t)= cost + sint + cost sint.	CO1	L3	**5M**
	b	Discuss about dirichlets conditions for fourier series.	CO2	L2	**5M**

UNIT-II

4		Find the Nyquist rate of the following signals. (a) x(t)=2 Sin 10πt. Sin 50πt (b) $x(t)=\cos^2 10\pi t$	CO3	L3	**10M**

OR

5	a	Explain convolution property of Laplace transform.	CO4	L3	**5M**
	b	Find the Laplace transform of $x(t)=e^{-t} u(-t)+e^{5t} u(t)$	CO4	L3	**5M**

UNIT-III

6	a	Define linear time variant system.	CO1	L1	**5M**
	b	For a discrete system having x[n] = {1,2,3,4} and h[n] = {1,2,1,-1} find the output response y[n].	CO4	L3	**5M**

OR

7		Derive the relationship between the bandwidth and rise time of ideal low pass Filter.	CO4	L3	**10M**

UNIT-IV

8	a	Define Wide Sense Stationary Process and write it's conditions.	CO6	L1	**5M**
	b	A random process is given as X(t) = At, where A is a uniformly distributed random variable on (0,2). Find whether X(t) is wide sense stationary or not.			**5M**

OR

9		Explain about the following random process (i) Mean ergodic process (ii) Correlation ergodic process (iii) Gaussian random process	CO6	L2	**10M**

UNIT-V

10		Derive the relationship between cross-power spectral density and cross correlation function.	CO2	L3	**10M**

OR

11	**a**	Consider a random process X(t)=cos($\omega t + \theta$) where ω is a real constant and θ is a uniform random variable in (0, π/2). Find the average power in the process.	CO6	L3	**5M**
	b	Define and derive the expression for average power of Random process.	CO6	L1	**5M**

***** END *****

O.P.Code:23EE0207	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Supplementary Examinations August-2025
ELECTROMAGNETIC FIELD THEORY
(Electrical & Electronics Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define stokes theorem.	CO1	L1	2M
	b	Describe the relationship between potential gradiant and electric field.	CO1	L2	2M
	c	Define dielectrics.	CO2	L1	2M
	d	Define electric dipole.	CO2	L1	2M
	e	State Biot –Savarts law.	CO3	L1	2M
	f	Define magnetic moment	CO3	L1	2M
	g	Define self inductance.	CO5	L1	2M
	h	Describe the energy density in magnetic field.	CO5	L2	2M
	i	Define skin depth.	CO6	L1	2M
	j	Define displacement current.	CO6	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Two points A (2,2,1) and B (3,-4,2) are given in the cartesian systems. Obtain the vector from A to B and a unit vector directed from A to B.	CO1	L3	5M
	b	State and explain Coulomb's law indicating clearly the units of quantities in the equation of force.	CO1	L2	5M

OR

3	a	Determine whether or not the following potential fields satisfy the Laplace's equation $V=x^2-y^2+z^2$ & ii) $V= r\cos\phi +z$.	CO1	L3	5M
	b	Transform the vector field $W=10\ a_x -8\ a_y +6\ a_z$ to cylindrical co-ordinate system at point P (10, -8, 6).	CO1	L3	5M

UNIT-II

4		Explain the boundary conditions of two perfect dielectrics materials.	CO2	L4	10M

OR

5		Two pint charges 1.5nC at (0,0,0.1) and -1.5nC at (0,0,-0.1) are in free space. Treat the two charges as a dipole at the origin and find the potential at p(0.3,0,0.4).	CO2	L3	10M

UNIT-III

6	A Point charge of Q=-1.2 C has a velocity V=(5 a_x +2 a_y -3a_z)m/s. Find the magnitude of the force exerted on the charge if i) E= -18 a_x +5 a_y -10 a_z V/m and ii) B=-4 a_x +4 a_y +3 a_z T, iii) Both are present simultaneously.	CO3	L4	10M

OR

7	Evaluate both sides of the stokes theorem for the filed H=6xy a_x -3y^2a_y A/m and the rectangular path around the region 2<x<5, -1<y<1 , Z=0 . Let the positive direction of ds be a_z.	CO4	L3	10M

UNIT-IV

8	Derive the expression for self-inductance of toroid.	CO5	L4	10M

OR

9	A Straight long wire is situated parallel to one side of a square coil. Each side of the coil has a length of 10 cm. The distance between straight wire and the centre of the coil is 20 cm. Find Mutual Inductance of the system.	CO5	L3	10M

UNIT-V

10	Derive an expression for motional and transformer induced emf.	CO6	L4	10M

OR

11	Explain faradays law of electromagnetic induction and derive the expression for induced EMF.	CO6	L3	10M

***** END *****

O.P.Code: 23CS0506	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Supplementary Examinations August-2025
DIGITAL LOGIC AND COMPUTER ORGANIZATION
(Common to CSIT, CSE, CIC, CCC, CAI, CSM, CAD)

Time: 3 Hours **Max. Marks: 70**

PART-A
(Answer all the Questions **10 x 2 = 20** Marks)

1	a	What are the basic properties of Boolean algebra?	CO1	L2	2M
	b	Define K-map	CO1	L1	2M
	c	Draw the truth table of SR Flip Flop	CO2	L2	2M
	d	Define a sequential circuit and draw its block diagram.	CO2	L2	2M
	e	What is floating point numbers?	CO3	L1	2M
	f	What are the basic operations to execute a complete instruction?	CO3	L1	2M
	g	Define main memory and auxiliary memory	CO6	L2	2M
	h	Define virtual memory?	CO4	L2	2M
	i	Classify interface circuits?	CO5	L3	2M
	j	What are the examples of processor?	CO6	L1	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Simplify the expression $Y = \Pi (0, 1, 4, 5, 6, 8, 9,12, 13,14)$ using K-map.	CO1	L3	5M
	b	Convert the following to Decimal and then to Octal (i) $(1234)_{16}$ (ii) $(10110011)_2$	CO1	L3	5M

OR

3	a	Explain the codes (i) BCD (ii) Excess-3	CO1	L2	5M
	b	Simplify the following Boolean Expressions: A'C'+ABC+AC'+AB to three literals.	CO2	L4	5M

UNIT-II

4	a	Draw a 4-bit Bi-direction shift register and explain the operation.	CO3	L2	5M
	b	Differentiate between I/O unit and memory unit.	CO1	L3	5M

OR

5	a	Design 3 Bit Down Synchronous counter using T Flip Flop	CO2	L4	5M
	b	Explain the functional units in the computer.	CO2	L2	5M

UNIT-III

6	a	Explain the Flow chart for Addition and Subtraction.	CO3	L2	5M
	b	Differentiate between Hardwired Control and Micro-programmed control.	CO4	L2	5M

OR

7	a	Explain the multiple bus organization.	CO3	L2	6M
	b	What is micro programed Control? Explain in detail with a neat diagram	CO4	L3	4M

UNIT-IV

8	a	Explain 128*8 RAM with block diagram and function table.	CO5	L2	6M
	b	What are the performance considerations in cache memory?	CO5	L2	4M

OR

9	a	Describe about memory hierarchy concept in detail?	CO5	L1	5M
	b	What is Virtual Memory? Discuss how address mapping using pages	CO5	L2	5M

UNIT-V

10	a	Explain about interrupt service routine (ISR).	CO6	L3	5M
	b	Draw the USB architecture and explain it.	CO6	L2	5M

OR

11	a	Explain the interrupts in input/output organization.	CO6	L2	5M
	b	Compare data, address and control buses.	CO6	L2	5M

*** END ***

O.P.Code: 23CS0901	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

PRINCIPLES OF ARTIFICIAL INTELLIGENCE

(Common to CSM & CAI)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	What is AI? List out the categories in which AI definitions are organized	CO1	L2	**2M**
	b	List the different types of problems in AI.	CO1	L1	**2M**
	c	What is meant by Adversarial search in AI?	CO2	L1	**2M**
	d	State Heuristic function and Heuristic values.	CO2	L1	**2M**
	e	What is Knowledge? Give its types.	CO3	L2	**2M**
	f	List the kind of knowledge which needs to be represented in AI systems	CO3	L1	**2M**
	g	What is FOL?	CO4	L2	**2M**
	h	State difference between Reinforcement Learning and Supervised Learning.	CO4	L1	**2M**
	i	What is Meta knowledge and the in what orders they are divided?	CO4	L2	**2M**
	j	Draw the block diagram of expert system working	CO5	L2	**2M**

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2		Describe the major milestones in the history of artificial intelligence.	CO1	L2	**10M**
		OR			
3	a	Discuss the four components used to define a problem formally.	CO1	L2	**5M**
	b	Illustrate with an example what is meant by formulating problems.	CO1	L3	**5M**

UNIT-II

4		Discuss Uninformed search with its search algorithms stating examples and complexity in its implementation.	CO2	L2	**10M**
		OR			
5		Describe Mini-Max Algorithm in Artificial Intelligence. Solve the following Game tree using Mini-Max Algorithm.	CO2	L2	**10M**

UNIT-III

6		Discuss in detail the key issues related to knowledge representation in AI.	CO3	L2	**10M**
		OR			
7	a	Explain in detail Bayes' probabilistic interferences with an example.	CO3	L3	**6M**
	b	Explain in detail about Dempster Shafer Theory with an example.	CO3	L3	**4M**

UNIT-IV

8		Illustrate the knowledge-engineering process with a real time example in detail.	CO4	L6	**10M**
		OR			
9		Explain decision tree in detail with example. Discuss how identification of attribute is performed in decision tree.	CO4	L3	**10M**

UNIT-V

10		What is an expert system? Discuss the need of it. Give detailed explanation of components of expert system with neat diagram.	CO5	L2	**10M**
		OR			
11		Explain XCON with its functions, key features, architecture components, benefits, and challenges.	CO5	L3	**10M**

***** END *****

O.P.Code: 23ME0303	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

THERMODYNAMICS

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define the term Surroundings.	CO1	L1	2M
	b	What do you mean by control volume?	CO1	L1	2M
	c	Define the term work.	CO2	L1	2M
	d	What do you mean by Thermal reservoir?	CO2	L1	2M
	e	State third law of thermodynamics.	CO3	L1	2M
	f	What do you mean by availability?	CO3	L1	2M
	g	Define the term pure substance.	CO4	L1	2M
	h	Define dryness fraction.	CO4	L1	2M
	i	What do you mean by air conditioning?	CO5	L1	2M
	j	What is meant by refrigeration?	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Compare closed system with an open system.	CO1	L4	5M
	b	What is meant by thermodynamic equilibrium? Explain in brief.	CO1	L2	5M
		OR			
3	a	Explain reversible process with an example.	CO1	L5	5M
	b	What are the causes for irreversibility?	CO1	L1	5M

UNIT-II

4		Explain about Work and Heat transfer. And classify the work transfers.	CO2	L2	10M
		OR			
5		State First law of thermodynamics and its applications in brief.	CO2	L6	10M

UNIT-III

6	a	Derive an equation for Gibbs and Helmholtz functions.	CO3	L3	5M
	b	Derive the Maxwell relations.	CO3	L3	5M
		OR			
7		5 kg of air at 550 K and 4 bar is enclosed in a closed system. (i) Determine the availability of the system if the surrounding pressure and temperature are 1 bar and 290 K respectively. (ii) If the air is cooled at constant pressure to the atmospheric temperature determine the availability	CO3	L4	10M

UNIT-IV

8		Build the phase equilibrium diagram for a pure substance P-V , P-T T-S plot with relevant constant property line	CO4	L6	10M
		OR			
9		Determine the amount of heat, which should be supplied to 2 kg of water at 25°C to convert it into steam at 5 bar and 0.9 dry	CO4	L2	10M

UNIT-V

10		Explain the psychometric properties in brief	CO5	L5	10M
		OR			
11		Explain the desirable properties of refrigerant in detail	CO5	L2	10M

***** END *****

O.P.Code:20ME0305	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

MATERIAL SCIENCE AND METALLURGY

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	State the Gibb's rule .	CO1	L1	2M
	b	Define Phase diagram and listout the types of phase diagrams.	CO1	L1	2M
	c	Describe the plain carbon steel.	CO2	L1	2M
	d	What is the super alloy?	CO2	L1	2M
	e	Define the annealing process and write its purposes.	CO3	L1	2M
	f	Define the toughness and how it is measured?	CO3	L1	2M
	g	Define sintering in powder metallurgy and list out its types.	CO4	L1	2M
	h	What are cermets and write is examples.	CO4	L1	2M
	i	List out the advantages of composite materials.	CO5	L1	2M
	j	What is glass and write any two properties of it.	CO5	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2		Describe the various imperfections in crystals and their effects on properties	CO1	L1	10M
		OR			
3		Draw and explain the **Fe-Fe_3 C** phase diagram invariant reactions.	CO1	L3	10M

UNIT-II

4	a	Explain the structure and properties of Spheroidal graphite cast iron.	CO2	L2	5M
	b	Discuus about the Hadfield steels.	CO2	L1	5M
		OR			
5		List out the compositions, properties and uses of the following alloys: (i) Cartridge brass (ii) Muntz Metal (iii) Gun metal (iv) Bell metal (v) Y-alloy	CO2	L1	10M

UNIT-III

6		Explain the ' TTT 'diagrams in detail about their construction and significance.	CO3	L2	10M
		OR			
7	a	Explain about various hardening process for alloys.	CO3	L2	5M
	b	Explain in details about age hardening process.	CO3	L2	5M

UNIT-IV

8	a	Explain the need of powder metallurgy.	CO4	L2	6M
	b	List out the advantages and disadvantages of powder metallurgy.	CO4	L1	4M
		OR			
9		Explain the methods of producing metal powders.	CO4	L2	10M

UNIT-V

10	a	Define composite material. Explain the function of matrix, reinforce phases.	CO5	L1	5M
	b	Explain carbon – carbon composites. Discuss about their properties.	CO5	L2	5M
		OR			
11		Explain in detail about nano materials and smart materials.	CO5	L2	10M

*** END ***

O.P.Code: 23EC0403	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Supplementary Examinations August-2025

DIGITAL CIRCUITS DESIGN

(Electronics & Communications Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Perform the following Subtraction using 10's complement method. i) 3456 – 245 ii) 631-745	CO1	L1	2M
	b	What are Universal Gates? Give their truth tables.	CO1	L1	2M
	c	Define Multiplexer and Demultiplexer.	CO4	L1	2M
	d	What is a Priority encoder?	CO4	L1	2M
	e	What is the Sensitivity list?	CO6	L1	2M
	f	What are Verilog parallel case and full case statements?	CO6	L2	2M
	g	What is race condition?	CO4	L1	2M
	h	What is the application of T flip flop?	CO4	L1	2M
	i	List some of the limitations of finite state machines.	CO2	L1	2M
	j	List basic types of programmable logic devices.	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Prove De Morgan's theorems using Perfect Induction Method.	CO1	L3	5M
	b	Simplify the given Boolean expression to a sum of 3 terms. A'C'D' +AC' +BCD + A'CD' + A'BC + AB'C'	CO2	L4	5M
		OR			
3	a	Obtain the simplified SOP and POS form of the following boolean expression, Y= B C + A C' +A B + A B C using K-map.	CO2	L1	5M
	b	Obtain the Dual and complement to the following Boolean expression AB'C+AB'D+A'B'	CO3	L1	5M

UNIT-II

4	a	Design a Full Subtractor using truth table.	CO4	L3	5M
	b	Construct a BCD Adder-circuit using 4-bit binary adders.	CO4	L3	5M
		OR			
5		Explain Binary Multiplier with an example.	CO4	L2	10M

UNIT-III

6	a	Explain Conditional operator in Verilog with an example.	CO6	L2	5M
	b	State For loop statement in Verilog and explain the same with an example	CO6	L1	5M
		OR			
7		Write an Verilog code for 2 Bit binary multiplier in structural Model.	CO6	L2	10M

UNIT-IV

8	a	Design an 2-bit synchronous up-counter using Verilog Code	CO4	L6	5M
	b	Explain about the Ring counter in detail.	CO4	L2	5M
		OR			
9		Design a 4 bit Decade counter	CO4	L4	10M

UNIT-V

10	a	Distinguish between Mealy & Moore machines.	CO5	L2	5M
	b	Compare PROM,PLA & PLA.	CO5	L2	5M
		OR			
11		Explain in brief about Programmable Read Only Memory (PROM) with a suitable example.	CO5	L2	10M

***** END *****