Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23MAT103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

PROBABILITY AND STATISTICS FOR ENGINEERS

(Civil Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define axiomatics definition of probability.	1M	1	1
	ii.	Define probability density function.	1M	1	1
	iii.	X is the binomial variate with parameters n= 15 and p= 0.2 find variance of X	1M	2	1
	iv.	Define normal distribution.	1M	2	1
	v.	Define expectation for a continuous joint density function.	1M	3	1
	vi	Write the formula for correlation coefficient.	1M	3	1
	vii.	What is Level of Significance?	1M	4	1
	viii.	Define degree of freedom.	1M	4	1
	ix.	What is the basic purpose of ANOVA?	1M	5	1
	x.	What are the basic principles of Design of Experiments.	1M	5	1
Q.2(A)		A computer center has three printers A, B, and C, which print at different speeds. Programs are routed to the first available printer. The probability that a program is routed to printers A, B and C are 0.6, 0.3 and 0.1 respectively. Occasionally a printer will jam and destroy the printout. The probability that printers A, B and C will jam are 0.01, 0.05 and 0.04 respectively. Your program is destroyed when a printer jams. What is the probability that: (i)Printer A is involved? (ii)Printer B is involved? (iii)Printer C is involved?	12M	1	3
		OR			
Q.2(B)		A continuous random variable X has the probability density function, $f(x)=\begin{cases} cx(2-x), if\ 0 \le x \le 2 \\ 0, otherwise \end{cases}$, where c is a constant. Find the mean and variance of X.	12M	1	3
Q.3(A)		Let X be a Poisson random variable with parameter $\lambda = 10$. a) Find the expression for the density for X. b) Find $E[x], VarX, \sigma_x$ c) Find $P[X \leqslant 4]$ d) Find $P[X > 4]$ e) Find $P[X \geqslant 4]$ f) Find $P[4 \leqslant X \leqslant 9]$	12M	2	3
		OR			
Q.3(B)		Among diabetics, the fasting blood glucose level X may be assumed to be approximately normally distributed with mean 106 milligrams and standard deviation 8 milligrams. (i)Find the probability that randomly selected diabetics will have blood glucose level between 90 and 122 mg. (ii)Find $P[X \le 120\ mg]$. (iii) Find the point that has the property that 25% of all diabetics have a fasting glucose level of this value or lower.	12M	2	3
Q.4(A)		For the following bivariate probability distribution, find the values of (i)$E(X)$ and $E(Y)$. (ii)$V(X)$ and $V(Y)$ (iii)Conditional densities of X given $Y = 1$. (iv)Conditional densities of Y given $X = 2$.	12M	3	4

$X\backslash Y$	1	2	3		4
1	4/36	3/36	2/36		1/36
2	1/36	3/36	3/36		2/36
3	5/36	1/36	1/36		1/36
4	1/36	2/36	1/36		5/36

OR

Q.4(B) The joint density for (X, Y) is given by, 12M 3 4

$f(x,y) = \frac{x^3y^3}{16} \quad 0 \le x \le 2, 0 \le y \le 2$

(i) Find the marginal densities for X and Y.
(ii) Are X and Y independent? Justify your answer.
(iii) Find $P(X \le 1)$.
(iv) Find $P(X \le 1, Y \le 1)$.

Q.5(A) Two types of cars produced in U.S.A are tested for petrol mileage, and the following information is obtained 12M 4 3

	Average	S.D	Sample size
Car-A	25	8	8
Car-B	20	5	7

Is the difference in the average mileage significant?

OR

Q.5(B) A random sample of 10 boys had the following I.Q.: 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean I.Q. of 100 (Test at 5% significance level)? 12M 4 3

Q.6(A) The following table shows the lives in hours of four brands of electric lamps: 12M 5 5

Brand
A: 1610, 1610, 1650, 1650, 1680, 1700, 1720, 1800
B: 1580, 1640, 1640, 1700, 1750
C: 1460, 1550, 1600, 1620, 1640, 1660, 1740, 1820
D: 1510, 1520, 1530, 1570, 1600, 1680
Perform an analysis of variance and test the homogeneity of the mean lives of the four brands of lamps.

OR

Q.6(B) Analyse the following LSD and state your conclusions. 12M 5 5

A 12	C 18	B 10	D 8
C 18	B 12	D 6	A 7
B 22	D 10	A 5	C 21
D 12	A 7	C 27	B 17

*** **END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23MAT104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

COMPLEX VARIABLES AND TRANSFORMS

(Electrical & Electronics Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q. No.		Question	Marks	CO	BL
Q.1	i.	State Cauchy-Riemann equations in polar form	1M	1	2
	ii.	Separate real and imaginary parts of e^z	1M	1	2
	iii.	Evaluate $\oint_C \frac{z^2}{z-1} dz, C: \|z\| = 1.$	1M	2	1
	iv.	State the Cauchy Residue theorem.	1M	2	2
	v.	Find Laplace transform of t^3.	1M	3	1
	vi	Define the Laplace transform of $u(t-a)$	1M	3	1
	vii.	Write the Fourier sin & cosine series for $f(x)$ in $-\pi \le x \le \pi$.	1M	4	1
	viii.	Define inverse Fourier sine transform.	1M	4	1
	ix.	State the initial value theorem for the Z-transform.	1M	5	2
	x.	Define Damping rule.	1M	5	1
Q.2(A)		For the function defined by $f(z) = \begin{cases} \frac{(\bar{z})^2}{z}, & if\ z \neq 0 \\ 0, & if\ z = 0 \end{cases}$, show that the C-R equations are satisfied at (0, 0), but $f(z)$ is not differentiable at (0, 0).	12M	1	3
		OR			
Q.2(B)		(i) Find analytic function whose imaginary part is $x^3y - xy^3 + xy + x + y$	6M	1	3
		(ii) Find analytic function whose real part is $e^x \cos y$	6M	1	3
Q.3(A)		(i) Using Cauchy's integral formula, evaluate $\oint_C \frac{\cos \pi z}{z^2-1} dz$ around a rectangle with vertices $2 \pm i, -2 \pm i$.	6M	2	3
		(ii) Expand the function $sinz$ in a Taylors series about $z = 0$ and determine the region of convergence.	6M	2	2
		OR			
Q.3(B)		Determine the poles of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ and the residue at each pole. Hence evaluate $\oint_C f(z)dz$, where C is the circle $\|z\| = 2.5$.	12M	2	3
Q.4(A)		State and prove Convolution theorem on Laplace transforms.	12M	3	2
		OR			
Q.4(B)		Solve the differential equations $y'' + 4y = 4x$ that satisfies the initial conditions $y(0) = 1$ and $y'(0) = 5$ by using Laplace transform.	12M	3	3
Q.5(A)		Find the Fourier series of the function $f(x) = \begin{cases} -\frac{\pi}{2}, -\pi \le x < 0 \\ \frac{\pi}{2}, 0 \le x \le \pi \end{cases}$	12M	4	3
		OR			
Q.5(B)		Find the Fourier transform of $e^{-a^2x^2}$, a<0. Hence deduce that $e^{-x^2/2}$ is self reciprocal in respect of Fourier transform.	12M	4	3
Q.6(A)		If $U(z) = \frac{2z^2+3z+12}{(z-1)^4}$, find the value of u_2 and u_3.	12M	5	3
		OR			
Q.6(B)		Use Convolution theorem, evaluate the inverse Z-transforms of the following: (i) $\frac{z^2}{(z-1)(z-3)}$, (ii) $\left(\frac{z}{z-a}\right)^2$	12M	5	3

*** END***

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23MAT106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

COMPLEX VARIABLES AND PROBABILITY THEORY

(Electronica & Communication Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Verify the function $f(z)=3x+y+i(3y-x)$ is analytic?	1M	1	2
	ii.	State cartesian form of Cauchy-Riemann equations.	1M	1	1
	iii.	Evaluate $\int_C \frac{z}{9-z^2}\,dz$, where C is the circle $\|z\|=2$	1M	2	2
	iv.	State Cauchy's residue theorem.	1M	2	1
	v.	Define axiomatic definition of probability.	1M	3	1
	vi	A continuous random variable X having density function $f(x)=k(1-x^2)$; $0\le x\le 1$. Find the value of the constant k ?	1M	3	2
	vii.	Define moments about the origin.	1M	4	1
	viii.	State the Chebyshev's inequality?	1M	4	1
	ix.	If joint $p.d.f$ of X and Y is $f_{X,Y}(x,y)=kxy;\ 0<x<1$ *and* $0<y<2$ then find the value of k	1M	5	2
	x.	Define Statistical independence of two random variables.	1M	5	1
Q.2(A)		Prove that the function $f(z)$ defined by $f(z)=\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2};(z\neq 0)$. $f(0)=0$ is continuous and Cauchy-Riemann equations are satisfied at the origin, yet $f'(0)=0$ does not exist.	12M	1	3
		OR			
Q.2(B)		(i) show that (x^2-y^2) and $\frac{y}{(x^2+y^2)}$ are harmonic functions but not harmonic conjugate.	6M	1	3
		(ii) Find the analytic function whose imaginary part is $e^{-x}(x\cos y+y\sin y)$.	6M	1	3
Q.3(A)		(a) Evaluate $\int_0^{2+i}(\bar{z})^2\,dz$ along the line $y=x/2$.	6M	1	3
		(b) Evaluate $\oint_C \frac{\sin\pi z^2+\cos\pi z^2}{(z-1)(z-2)}dz$, where C is the circle $\|z\|=3$ using Cauchy's integral formula.	6M	1	3
		OR			
Q.3(B)		(i) Expand the function $\frac{1}{(z+1)^2}$ in Tayler series about the point $z=i$.	6M	1	3
		(ii) Find the Laurent's expansion of $f(z)=\frac{z^2-1}{z^2+5z+6}$ about $z=0$ in the region $2<\|z\|<3$.	6M	1	3
Q.4(A)		In a binary communication system of two transmitted symbols 0, and 1. Define appropriate events A_i and B_i, $i=1,2$ to represent symbols after and before channel respectively. Assume channel transition probabilities are all equal at $P(A_i\|B_j)=0.1$, $i\neq j$ and are $P(A_i\|B_i)=0.9$ for $i=j=1,2$, while symbol transmission probabilities are $P(B_1)=0.6$, and $P(B_2)=0.4$. Compute the received symbol probabilities $P(A_1),P(A_2)$? Compute the posterior probabilities for the system?	12M	3	4

OR

Q.4(B)	(i) A random variable X has the density function $f_X(x)=\frac{1}{2}u(x)e^{-\frac{x}{2}}$. Define events $A=\{1<X\leq 3\}$, $B=\{X\leq 2.5\}$ and $C=A\cap B$. Find the probabilities of the events (a) A (b) B and (c) C	6M	1	3
	(ii) 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 $42m$. (a) What is the probability of being disqualified in the qualifying round? (b) In the main event what is the probability the record will be broken?	6M	1	3
Q.5(A)	Show that the mean value and variance of the random variable ha uniform density function are: $\overline{X}=E(X)=\frac{b+a}{2}$ and $\sigma_X^2=\frac{(b-a)^2}{12}$	12M	4	3

OR

Q.5(B)	Derive the moment generating function of binomial distribution and find mean and variance?	12M	4	4
Q.6(A)	Given the function $f_{X,Y}(x,y)=b(x+y)^2;\ -2<x<2\ and\ -3<y<3$. (a) Find the constant b such that this is a valid joint density function. (b) Determine the marginal density functions $f_X(x)$ and $f_Y(y)$ (c) Test whether X and Y are Statistically independent?	12M	5	4

OR

Q.6(B)	Two random variables X and Y are related by the expression $Y=aX+b$; where a and b are any real numbers. (a) Show that $\rho=\begin{cases}1 & if\ a>0\ for\ any\ b\\ -1 & f\ a<0\ for\ any\ b\end{cases}$ (b) Show that their covariance is $C_{X,Y}=a\sigma_X^2$	12M	5	3

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23HUM102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

ECONOMICS AND FINANCIAL ACCOUNTING FOR ENGINEERS

(Common to All)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What is elasticity of demand?	1M	1	1
	ii.	State the Law of Supply.	1M	1	2
	iii.	Define Break-Even Point (BEP).	1M	2	2
	iv.	State any two limitations of Break-Even Analysis.	1M	2	2
	v.	How is price determined under monopoly?	1M	3	1
	vi	Define pricing objectives.	1M	3	2
	vii.	What is a Trial Balance?	1M	4	1
	viii.	Define Real and Personal accounts.	1M	4	2
	ix.	What is Profitability Ratio?	1M	5	1
	x.	Write any two activity ratios.	1M	5	1
Q.2(A)		Explain different types of price elasticity of demand with suitable examples and diagrams.	12M	1	3
		OR			
Q.2(B)		Discuss the determinants of supply and illustrate how changes in these determinants shift the supply curve.	12M	1	2
Q.3(A)		What is Break-Even Analysis (BEA)? Discuss its significance, assumptions, and limitations. Illustrate with a diagram showing the break-even point.	12M	2	2
		OR			
Q.3(B)		A company sells a product at ₹50 per unit. The variable cost per unit is ₹30 and total fixed cost is ₹2,00,000. a) Calculate the Break-Even Point (BEP) in units and in rupees. b) If the company wants to earn a profit of ₹1,00,000, calculate the required sales volume.	12M	2	4
Q.4(A)		What is a monopoly? Explain how price and output are determined in the short run and long run.	12M	3	2
		OR			
Q.4(B)		Discuss various pricing strategies used by firms in different market structures with examples	12M	3	2
Q.5(A)		Explain Accounting Principles with examples.	12M	4	2
		OR			
Q.5(B)		Journalise the following transactions: 1. 01.01.2025 Started business with cash ₹50,000 2. 03.01.2025 Purchased goods for cash ₹8,000 3. 10.01.2025 Sold goods on credit to Anil ₹12,000 4. 20.01.2025 Paid rent ₹2,000 5. 31.01.2025 Received cash from Anil ₹12,000	12M	4	4
Q.6(A)		Explain the types of Capital budgeting techniques.	12M	5	2

OR

Q.6(B)	From the following information compute: • Net Sales: ₹12,00,000 • Cost of Goods Sold: ₹9,00,000 • Average Inventory: ₹1,50,000 • Net Profit: ₹1,80,000 • Total Assets: ₹10,00,000 Calculate: a) Inventory Turnover Ratio b) Net Profit Ratio c) Return on Total Assets (ROTA) Interpret the results.	12M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23HUM101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

UNIVERSAL HUMAN VALUES

(Common to All)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q. No		Question	Marks	CO	BL
Q.1	i.	Why is value education important in modern society?	1M	1	1
	ii.	Define happiness and prosperity in your own words.	1M	1	1
	iii.	Describe self-regulation.	1M	2	1
	iv.	Why is the body called an instrument of the self?	1M	2	1
	v.	Differentiate between and affection and love.	1M	3	2
	vi	What is meant by the term "Justice"?	1M	3	1
	vii.	Define co-existence in the context of existence.	1M	4	1
	viii	What is innateness of animal order?	1M	4	1
	ix.	State the term "Human Education".	1M	5	1
	x.	Quote ethical conduct of profession.	1M	5	1
Q.2(A)		Explain how right understanding, right relationships, and right utilization of physical facilities help fulfill basic human aspirations.	12M	1	2
		OR			
Q.2(B)		Describe the process of self-exploration with a neat diagram and suitable examples.	12M	1	2
Q.3(A)		Explain in detail the harmony within the self and its significance in daily life.	12M	2	2
		OR			
Q.3(B)		Describe program for maintaining health of the body and discuss the priority in detail.	12M	2	2
Q.4(A)		Explain respect as "right evaluation" rather than fear or obligation.	12M	3	2
		OR			
Q.4(B)		Discuss the human goal and describe systems/dimensions for fulfilling it.	12M	3	2
Q.5(A)		Explain the interconnectedness among the four orders of nature (physical, bio, animal, human).	12M	4	2
		OR			
Q.5(B)		Draw a chart showing all units and space in existence.	12M	4	2
Q.6(A)		Discuss criteria for holistic technologies, production systems and management models.	12M	5	2
		OR			
Q.6(B)		Define professional ethics. Why is competence in ethics essential for engineers/managers?	12M	5	2

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23MAT107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

PROBABILITY AND STATISTICS FOR COMPUTER SCIENCE

(Common to CSE, CSE-DS, CSE-AI, CSE-AIML)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define axiomatic definition of probability.	1M	1	1
	ii.	The function f(x) = kx^3 in 0 < x < 1 is a valid *p.d.f.* find the value of K	1M	1	2
	iii.	What is the *m.g.f.* of the binomial distribution.	1M	2	1
	iv.	Find the value of z_1 such that $p(-z_1 < Z < z) = 0.95$	1M	2	2
	v.	If X and Y are random variables then $V(aX+bY)$ =	1M	3	1
	vi	Define Co-variance between two random variables.	1M	3	1
	vii.	Write a formula for Bowley's coefficient of skewness.	1M	4	1
	viii.	Define two regression coefficients.	1M	4	1
	ix.	If n=40 and σ =5 the standard error of mean is	1M	5	1
	x.	Define degree of freedom.	1M	5	1
Q.2(A)		(i) State and prove addition theorem on probability.	6M	1	3
		(ii) A computer center has three printers A, B, and C, which print at different speeds. Programs are routed to the first available printer. The probability that a program is routed to printers A, B and C are 0.6, 0.3 and 0.1 respectively. Occasionally a printer will jam and destroy the printout. The probability that printers A, B and C will jam are 0.01, 0.05 and 0.04 respectively. Your program is destroyed when a printer jams. What is the probability that printer A is involved? Printer B involved?	6M	1	3
		OR			
Q.2(B)		Let X denote the number of holes that for can be drilled per bit. The density for X is given the following table:	12M	1	3

x	1	2	3	4	5	6	7	8
$f(x)$	0.02	0.03	0.05	0.2	0.4	0.2	0.07	$f(8)$

(a) Find $f(8)$
(b) Find the table for F
(c) Use F to find the probability that a randomly selected bit can be used to drill between three and five holes inclusive.
(d) Find $p(X \le 4)$ and $p(X < 4)$. Are these probabilities the same?

Q.3(A)	(i) The probability that a wildcat well will be productive is 1/13. Assume that a group is drilling wells in various parts of the country so that the status of one well has no bearing on that of any other. Let X denote the number of wells drilled to obtain the first strike. (a) Write the expression for density of X? (b) What is the expression for moment generating function? (c) Find $p(X \ge 2)$?	6M	2	3
	(ii) If 'X' is a Poisson variate $p(X=2) = \frac{2}{3}p(X=1)$ find (a) $p(X=0)$, (b) $p(X=3)$.	6M	2	3
	OR			
Q.3(B)	Let X denote the bulk density of Pima clay loam. Studies show that X is normally distributed with $\mu = 1.5 g/cm^3$ and $\sigma = 0.2 g/cm^3$. (i) What is the expression for density?	12M	2	3

(ii) Find the $p(1.1 < X < 1.9)$?

(iii) Find the $p(X \le 0.9)$?

(iv) Find the $p(X \le 0.9)$?

(v) What point has the property that only 10% of the soil samples have bulk density this high or higher?

Q.4(A) For the following bivariate probability distribution find (i) marginal distributions of X and Y (ii) V(X) and V(Y) (iii) Covariance between X and Y (iv) Conditional densities of X given Y=2 — 12M — 3 — 4

X\Y	0	1	2	3
0	0.840	0.030	0.020	0.010
1	0.060	0.010	0.008	0.002
2	0.010	0.005	0.004	0.001

OR

Q.4(B) The joint density for (X,Y) is given by $f(x,y)=\frac{x^3y^3}{16};\ 0 \le x \le 2,\ 0 \le y \le 2$ — 12M — 3 — 4

(i) Find the marginal densities for X and Y.

(ii) Find $p(X \le 1, Y \le 1)$

(iii) Find V(X)

(iv) Find C(X,Y)

Q.5(A) Compute Pearson's coefficient of skewness for the following data: — 12M — 4 — 4

Class	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
f	5	9	14	20	25	15	8	1

OR

Q.5(B) (i) Calculate the rank correlation coefficient for the following data: — 8M — 4 — 3

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

(ii) Regression equations are $8X-10Y+66=0,\ 40X-18Y=214$; $\sigma_Y^2=9$. what were the mean values of 'X' and 'Y'; the coefficient of correlation between X&Y, the value of σ_Y. — 4M — 4 — 3

Q.6(A) (i) In a sample of 500 people from a state 280 take tea and rest take coffee. Can we assume that tea and coffee are equally popular in the state at 5% level of significance? — 6M — 5 — 3

(ii) A sample of 900 members is found to have a mean of 3.4 cm. Can it be reasonably regard as a truly random sample from a large population with mean 3.25 cm and standard deviation 1.61 cm. — 6M — 5 — 3

OR

Q.6(B) Ten students were given a test in PMS. They are given a extra coaching and a second test of equal difficulty was held at the end of it. Do the marks give evidence that the students have benefitted by extra coaching? — 12M — 5 — 4

Boys	1	2	3	4	5	6	7	8	9	10
Test-I	23	20	19	21	18	20	18	17	23	16
Test-II	24	19	22	18	20	22	20	20	23	20

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSE103/23CST103/23CSC103/23CSM103/23CSN103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

DIGITAL LOGIC & COMPUTER ORGANIZATION

(Common to CSE, CST, CSE-CS, CSE-AI&ML and CSE-N)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What is 2's complement representation?	1M	1	1
	ii.	List any two applications of multiplexers.	1M	1	1
	iii.	What is a shift register?	1M	2	1
	iv.	List any two functional units of a computer.	1M	2	1
	v.	What is overflow?	1M	3	1
	vi	Differentiate between CISC and RISC.	1M	3	2
	vii.	Draw memory hierarchy.	1M	4	1
	viii.	What is cache hit and cache miss?	1M	4	1
	ix.	Mention any two pipeline hazards.	1M	5	1
	x.	What is a multicore processor?	1M	5	1
Q.2(A)		Illustrate the process of error detection and correction using Hamming Code. Construct the code for data word 1101010 and show error correction.	12M	1	3
		OR			
Q.2(B)		i) Design a 3 bit full adder circuit using suitable logic gates.	6M	1	3
		ii) Reduce the following Boolean function F= $\Sigma m(0,2,3,6,7,10,11,15)$ using K-map method and obtain minimal SOP	6M	1	3
Q.3(A)		Explain the operation of a JK flip-flop with characteristic table and excitation table.	12M	2	2
		OR			
Q.3(B)		Design a 3 bit synchronous up counter.	12M	2	3
Q.4(A)		Illustrate the Booth's algorithm with suitable flowchart. Perform $(7)_{10} \times (-5)_{10}$ using booths algorithm.	12M	3	2
		OR			
Q.4(B)		Describe in detail about the x86 addressing modes.	12M	3	2
Q.5(A)		i) Explain in detail about semiconductor RAM and ROM memories.	4M	4	2
		ii) Explain various levels of RAID.	8M	4	2
		OR			
Q.5(B)		A computer system with a word length of 32 bits has a 16 MB byte addressable main memory and 64 KB 4-way set associative cache memory with a block size of 256 bytes. Consider the following physical addresses. A1=0x83C786, A2=0x3F625B, A3=0x6AAC1B. Determine the sets in the cache to which these physical addresses are mapped.	12M	4	4
Q.6(A)		i) Illustrate Flynn's taxonomy of Parallel Processor architectures.	6M	5	3
		ii) Write briefly about various pipelining stages	6M	5	2
		OR			
Q.6(B)		Explain Direct Memory Access (DMA) in detail by addressing DMA transfer modes.	12M	5	2

*** **END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23MAT108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

DISCRETE MATHEMATICAL STRUCTURES

(Common to CST and CSE-Cyber Security)

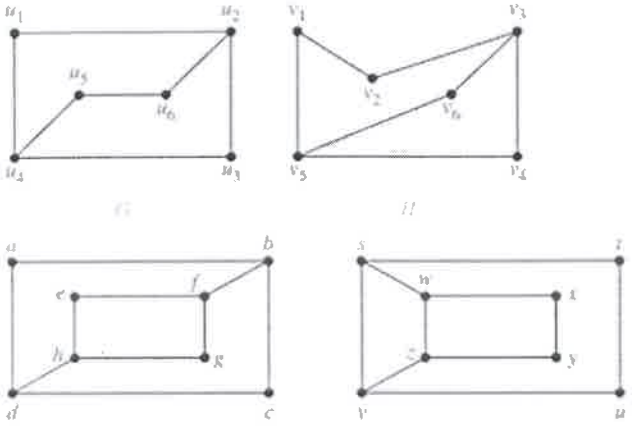
Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	State De Morgan's law in propositional logic.	1M	1	1
	ii.	State modus ponens rule in logical propositional.	1M	1	1
	iii.	State the generalised pigeonhole principle.	1M	2	1
	iv.	Construct the composition table for {1, 3, 5, 7, 9} with respect to multiplicative modulo 10.	1M	2	2
	v.	How many relations exist from {a, b, c} to {1, 2, 3, 4}	1M	3	2
	vi	Draw the Hasse diagram for the divisors of 20 ordered by the divisibility relation.	1M	3	2
	vii.	Define Fibonacci recurrence relation	1M	4	1
	viii.	Find the order of $a_n = 2a_{n-1} + 3n^2$.	1M	4	1
	ix.	Draw a complete graph of order 5.	1M	5	1
	x.	Construct a tree with 5 vertices.	1M	5	1
Q.2(A)		Use truth value tables to determine whether the following are Tautology or not: (i) $(p \wedge q) \vee (\neg p \wedge \neg q)$, (ii) $(p \rightarrow q) \rightarrow (p \wedge q)$ (iii) $(p \rightarrow q) \wedge (\neg q) \wedge p$ and (iv) $(p \rightarrow q) \rightarrow (p \wedge q)$	12M	1	3
		OR			
Q.2(B)		Apply appropriate inference rules to determine whether the following logical expressions are valid: (i) $R \rightarrow S$ can be derived from the premises $P \rightarrow (Q \rightarrow S)$, $\neg R \vee P$, and Q (ii) $S \vee R$ is a tautologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$.	12M	1	3
Q.3(A)		a. Determine the number of integers between 1 and 100 that are divisible by 2, 3 or 5 using the inclusion-exclusion principle. b. Apply the pigeonhole principle to determine the minimum number of students required in a discrete mathematics class to be sure that at least six will receive the same grade, if there are five possible grades, A, B, C, D, and F.	12M	2	3
		OR			
Q.3(B)		Construct the Cayley table for the permutation group S_3 of three symbols 1, 2 and 3. Show that $(S_3, *)$is a non- abelian group.	12M	2	3
Q.4(A)		A relation R on the set of real numbers R is defined by xRy if and only if $\lfloor 2x \rfloor = \lfloor 2y \rfloor$. (i) Verify that R is an equivalence relation. (ii) Determine the equivalence classes of 1/4 and 1/2. (iii) Describe the partition of R into the equivalence classes of R.	12M	3	3
		OR			
Q.4(B)		Let D_n be the set of divisors of a positive integers n. Construct the Hasse diagrams of D_{20} and D_{30} . Show that these both are Lattices and justify that these two are Boolean algebras or not.	12M	3	3
Q.5(A)		Solve the non-homogeneous linear recurrence relations with constant coefficients (i) $a_n = 5a_{n-1} - 6a_{n-2} + 7^n$ and (ii) $a_n = 5a_{n-1} - 6a_{n-2} + 2^n + n$.	12M	4	3

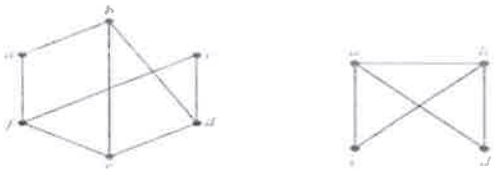
OR

Q.5(B)	Use generating function $G(x)$ to derive an explicit formula for the generating function $G(x)$ of the sequence $\{a_n\}$ where (i) $a_n = 1 + 2^n + 3^n$ (ii) $a_n = (-1)^n + 2n$.	12M	4	3
Q.6(A)	Determine whether the graphs G and H displayed in the Figures are isomorphic or not. If they are isomorphic, construct a bijection between their vertex sets that preserves adjacency.	12M	5	3



OR

Q.6(B)	Describe **adjacency matrix** and **incidence matrix** for representing graphs and explain their differences. Construct the **adjacency matrix** and **incidence matrix** for the graphs	12M	5	3



***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23MAT105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

NUMERICAL METHODS

(Mechanical Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Illustrate the convergence condition for iterative method.	1M	1	1
	ii.	Define transcendental equation.	1M	1	1
	iii.	Define Gauss backward interpolation formula.	1M	2	1
	iv.	Construct the difference table for the data	1M	2	2

x	30	35	40
$f(x)$	18	19	21

	v.	Define Newton's backward first derivative interpolation formula.	1M	3	1
	vi	In the numerical integration, if a=10 b=11 and n=20, find h value.	1M	3	1
	vii.	In R-K 2nd order method, write the k_1 and k_2 expressions.	1M	4	1
	viii.	Given that $\frac{dy}{dx} = x + 4y, y(0) = 1$ evaluate y(0.1) by Euler's method.	1M	4	2
	ix.	Define principle of least squares.	1M	5	1
	x.	Illustrate the normal equations of straight line.	1M	5	1
Q.2(A)		Determine the real root of the equation, $x^3 - 3x - 8 = 0$, by using the bisection method correct to 3 decimal places.	12M	1	
		OR			
Q.2(B)		Find the real root of equation $e^{\cos x} - 0.99 \sin x = 0$, by using secant method correct to 4 decimal places.	12M	1	3
Q.3(A)		Using Newton's forward & backward formulae, find y(3.5) and y(8.5)	12M	2	3

x	3	4	5	6	7	8	9
y	4.8	8.4	14.5	23.6	36.2	52.8	73.9

OR

Q.3(B)		From the given data, calculate f(3) and f(4) by using Lagrange's formula	12M	2	3

x	0	1	2	5
$f(x)$	2	3	12	147

Q.4(A)		Given data	12M	3	3

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Using Newton's forward differentiation formula, evaluate $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$.

OR

Q.4(B)		Evaluate $\int_0^{0.6} 5e^{-x^2} dx$ for n=6 by	12M		3
		(i) Trapezoidal rule			
		(ii) Simpson's $\frac{1}{3}$ rule			
		(iii) Simpson's $\frac{3}{8}$ rule			

Q.5(A)	Using Taylor's series method, solve the equation $\frac{dy}{dx} = -2x - y; y(0) = 1$. Find the $y(0.1)$ and $y(0.2)$.	12M	4	3
	OR			
Q.5(B)	Solve the differential equation by 4th order Runge-Kutta method, given that $\frac{dy}{dx} = xy + y^2$, $y(1) = 5$, find $y(1.1)$ and $y(1.2)$.	12M	4	3
Q.6(A)	Fit a 2nd degree parabola to the following data	12M	5	3

x	1	1.5	2	2.5	3	3.5	4
y	2.1	2.3	2.6	3.0	3.7	4.4	5.1

OR

Q.6(B)	Fit the exponential curve $y = ae^{bx}$ to the following data:	12M	5	3

x	77	100	185	239	285
y	3.4	4.4	8.0	12.1	20.6

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CE102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

STRENGTH OF MATERIALS

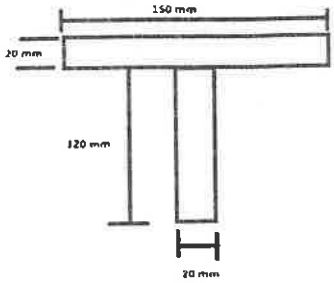
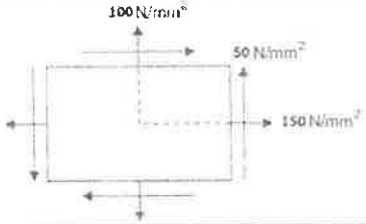
(Civil Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	State the St. Venant's Principle.	1M	1	1
	ii.	Write the formula for free expansion of the bar due to change in temperature.	1M	1	1
	iii.	Write the formula for Eulers theory of long columns if one end is free and another end is fixed.	1M	2	1
	iv.	Define the terms i) Shear Force ii) Bending Moment.	1M	2	1
	v.	Define Section Modulus.	1M	3	1
	vi	Draw the shear stress distribution for Triangular section.	1M	3	1
	vii.	Write the expression of Polar section modulus for a hollow circular shaft.	1M	4	1
	viii.	Define the terms i) Principal Plane ii) Principal stress.	1M	4	1
	ix.	What are the methods for finding out the slope and deflection at a section in a beam?	1M	5	1
	x.	Explain the concept on Mohr's Theorem-1.	1M	5	1
Q.2(A)		A bar is subjected to an axial force of 90 kN. It has a diameter of 36 mm and a length of 200 mm. The extension of the bar was found to be 0.089 mm and the change in diameter of the bar was found to be 0.0046 mm. **Find:** (i) Longitudinal strain (ii) Lateral (Transverse) strain (iii)Poisson's ratio (iv)Volumetric strain (v) Modulus of Elasticity (Young's modulus) (vi)Shear Modulus (Modulus of Rigidity) (vii) Bulk Modulus	12M	1	4
		OR			
Q.2(B)		A steel rod 3m long is fixed between two rigid walls at a temperature of 20°C. If the temperature rises to 60°C, calculate: (i) The thermal stress induced in the rod if expansion is prevented. (ii) Calculate thermal strain developed in the rod. (iii)The force exerted by the rod on the walls, if its cross-sectional area is 500mm². (Data: E=210,000 N/mm², $\alpha=12\times10^{-6}$/°C)	12M	1	4
Q.3(A)		A simply supported beam AB of length 8 meters is supported by a hinged (pinned) support at the left end (Point A) and a roller support at the right end (Point B). The beam carries point loads of 25 kN at 1 m, 40 kN at 3 m, and 20 kN at 6 m from Point A. (i) Calculate the reactions at supports A (Ra) and B (Rb) for the beam. (ii) Determine the shear force (SF) at all key points (iii)Determine the bending moment (BM) at all key points. (iv)Sketch the shear force and bending moment diagrams for the beam.	12M	2	4
		OR			
Q.3(B)		Find Euler's load for a rectangular column 50 mm x 40 mm in cross section and 2 m long, if both ends is fixed. E for the material of the	12M	2	4

column is 200 GN/m². Find the Rankine's load for the same load for the same column if the yield stress in compression is 350 N/mm². Take a = 1/7500

Q.4(A)	A Simply Supported beam of T- Section as shown in figure has a span of 8 m. It carries a Uniformly Distributed Load of 18 kN/m run over the entire span. Determine the Maximum Tensile and Maximum Compressive stresses. 	12M	3	4
	OR			
Q.4(B)	A beam of rectangular cross-section is 250 mm wide and 300 mm deep and of length 6 m is simply supported and carries a uniformly distributed load of 10 kN/m over the entire span. Calculate (i) Shear force at 2 m from the left support. (ii) Maximum shear Stress at 2 m from the left support. (iii) Shear stress distribution at 100 mm level from the top and bottom surface. (iv) Sketch the shear stress distribution.	12M	3	4
Q.5(A)	A hollow shaft, the internal diameter of which is 0.7 times the external diameter, is to transmit 380 kW at 140 rpm. The shear stress is not exceed 70 Mpa. Find the external and internal diameters assuming that the maximum torque is 1.25 times the mean.	12M	4	4
	OR			
Q.5(B)	The state of stress at a point in a strained material is shown in Figure. To Determine: (i) Centre of Mohr Circle (ii) Radius of Mohr Circle (iii) Major Principal stress (iv) Minor Principal stress (v) Maximum Shear stress (vi) Angles of Principal Planes (vii) Angles of Planes of Maximum shear stress (viii) Resultant stress on planes of maximum shear stress. 	12M	4	4
Q.6(A)	Using Moment Area method find (i) slope and deflection of a cantilever beam subjected to UDL over the entire span and	6M	5	4
	(ii) slope and deflection of SSB subjected to point load at center.	6M	5	4
	OR			
Q.6(B)	A Simply Supported Beam of span 7 m is loaded with a point load of 80 kN at a point 3 m from left support. Determine the deflection under the load point and maximum deflection. Take E=1 x 10^5 N/mm² and I=10 x 10^6 mm⁴.	12M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CE103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

SURVEYING

(Civil Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What are the basic principles of surveying?	1M	1	1
	ii.	List the different types of chain.	1M	1	1
	iii.	List the different types of levelling	1M	2	1
	iv.	What is fly levelling?	1M	2	1
	v.	Define back sight & Fore sight.	1M	3	1
	vi	What is the least count of a theodolite?	1M	3	1
	vii.	What are horizontal and vertical curves?	1M	4	1
	viii	Define Reverse Curve?	1M	4	1
	ix.	Define EDM?	1M	5	1
	x.	What is GIS?	1M	5	1
Q.2(A)		Explain in detail the various classification schemes of surveying.	12M	1	2
		OR			
Q.2(B)		The Following bearing for taken by traversing with a compass. Mention which station effected by local attraction and determine the corrected bearing.	12M	1	4

Lines	F.B.	BB
AB	45°45'	226°10'
BC	96°55'	277°5'
CD	29°45'	209°10'
DE	324°48'	144°48'

Q.3(A)		Explain the field procedure of levelling survey and its practical applications in detail.	12M	2	2
		OR			
Q.3(B)		The following observations were taken with dumpy level and 4 m levelling staff. The instrument was shifted after the 4th and 7th reading. The first reading was taken on a bench mark whose R.L. was 15.575 m. prepare a page of level book and determine RL of all the points. Use Height of collimation Method. Observations are: 0.565, 1.250, 1.675, 3.695,0.125, 2.345, 0.500, 1.785, 2.535.	12M	2	4
Q.4(A)		Demonstrate direct and deflection angles and describe the procedure to measure a horizontal angle using a theodolite.	12M	3	3
		OR			
Q.4(B)		Calculate the RL of the top of a tower from the following observations. The distance between P and Q is 70m and RL of Bench mark is 325.550 m. The station P & Q, tower are in same vertical plane.	12M	3	4

Ins. St	Staff Station	Vertical Angle	Staff readings (m)
O	P	18°30'	2.815
	Q	12°40'	1.865

Q.5(A)		Illustrate the elements of simple curve? Explain in detail its functions	12M	4	3
		OR			

Q.5(B)	Classify curves and explain with neat sketches.	12M	4	3
Q.6(A)	What is GPS? Discuss in detail about the different segments of GPS.	12M	5	3
	OR			
Q.6(B)	Write the advantages and applications of total station?	12M	5	3

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CE104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

FLUID MECHANICS AND HYDRAULICS

(Civil Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define cavitation.	1M	1	1
	ii.	Define Viscosity.	1M	1	1
	iii.	State Bernoulli's theorem	1M	2	1
	iv.	What is velocity potential?	1M	2	1
	v.	What is equivalent pipe?	1M	3	1
	vi	What is Major loss in pipe flow?	1M	3	1
	vii.	Define Froude's number	1M	4	1
	viii.	What is specific energy of flow?	1M	4	1
	ix.	What is the condition for M3 curve in GVF?	1M	5	1
	x.	What is gradually varied flow?	1M	5	1
Q.2(A)	(i) State Newton's law of viscosity		4M	1	1
	(ii) A plate 0.03 mm distant from a fixed plate moves at 45cm/s and requires a force of 2.5N/m^2 to maintain this speed. Determine the fluid viscosity between those two plates.		8M		4
	OR				
Q.2(B)	Explain the hydrostatic law. Prove that pressure at a point in static fluid is $p=\rho gh$		12M	1	4
Q.3(A)	(i) Classify different type of flows and state their conditions. Explain in which cases such type of flow occur.		8M	2	2
	(ii) The diameters of a pipe in section 1 and 2 are 10cm and 20cm, respectively. Find the discharge through the pipe if the velocity of flowing water at section 1 is 5m/s. Also, find velocity at section 2.		4M		4
	OR				
Q.3(B)	A 25 x10cm venturimeter is inserted in a vertical pipe carrying water, flowing in the upward direction. A differential mercury manometer connected to the inlet and the throat gives a reading of 22cm. Find the discharge. Take C_d=0.97.		12M	2	4
Q.4(A)	Find the head lost due to friction in a pipe of diameter 300mm and lentgh 70m. Rate of water flow is 3.2m/s. (i) use Darcy formula (ii) use Chezy's formula. Take C =62		12M	3	4
	OR				
Q.4(B)	The discharge through a rectangular channel of width 6m is 14m^3/s. When the depth of flow is 1.2m, calculate (i) Specific energy of flowing water, (ii) Critical depth and critical velocity (iii) Value of minimum specific energy.		12M	3	4
Q.5(A)	(i) Compare sub critical and super critical flow.		4M	4	2
	(ii) A rectangular channel of width 5m is having a bed slope of 1 in 1800 maximum discharge it can carry. Take value of C=50.		8M		4
	OR				
Q.5(B)	(i) Classify flow in open channels.		6M	4	2
	(ii) Find the discharge through a trapezoidal channel of width 6m and		6M	4	4

	side slope of 1:4 (H:V). The depth of flow of water is 2.2m and value of Chazy's constant C=50. The slope of the bed of the given channel is 1 in 4500			
Q.6(A)	(i) Based on Froude number, classify the hydraulic jumps. Draw suitable diagrams.	6M	5	2
	(ii) Depth of flow of water at a certain section of a rectangular channel of 2m width is 0.3m. The discharge through the channel is $2m^3/s$. Determine whether a hydraulic jump will occur and if so, find its height and loss of energy.	6M		4
	OR			
Q.6(B)	What is hydraulic jump? Derive the equation to find out the conjugate depths in Hydraulic Jump	12M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23EEE103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

ELECTROMAGNETIC FIELD THEORY

(Electrical & Electronics Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define position vector.	1M	1	1
	ii.	Define electric field intensity.	1M	1	1
	iii.	State Gauss law.	1M	2	1
	iv.	Define polarization.	1M	2	1
	v.	State Ampere's circuital law.	1M	3	1
	vi	Write the expression for Lorentz force equation.	1M	3	1
	vii.	Write the expression for energy stored in the magnetic field.	1M	4	1
	viii.	Define Self and Mutual Inductance.	1M	4	1
	ix.	State Poynting theorem.	1M	5	1
	x.	State Faraday's law of electromagnetic induction.	1M	5	1
Q.2(A)		State and explain Laplace's and poison's equations with expressions.	12M	1	2
		OR			
Q.2(B)		(i) State and explain Coulomb's law of electrostatic field in vector form.	6M	1	2
		(ii) Find the curls of (a) $V_a = -y\hat{x} + x\hat{y}$, (b) $V_b = x\hat{y}$	6M	1	3
Q.3(A)		(i)Develop the expression for potential at any point due to electric dipole.	6M	2	2
		(ii) Describe briefly about the conduction current density and also derive $J = \sigma E$.	6M	2	3
		OR			
Q.3(B)		The capacitance of the conductor formed by the two parallel metal sheets, each 200 cm^2,in area separated by a dielectric 2mm thick is 0.0004 micro farads. A potential of 20KV is applied to it. Find (i) Electric flux (ii) Potential gradient in kV/m (iii) The relative permittivity of materials (iv) Electric flux density.	12M	2	3
Q.4(A)		(i) Explain Ampere's circuital law with expression and diagram	6M	3	2
		(ii) Explain the force between two straight long and parallel current carrying conductors.	6M	3	3
		OR			
Q.4(B)		Find an expression for magnetic field intensity around infinitely long straight conductor using Biot Savart's law.	12M	3	2
Q.5(A)		Derive magnetic field due to long straight conductor; obtain mutual inductance between straight wire & square loop.	12M	4	2
		OR			

Q.5(B)	(i) A long solenoid has 500 turns. When a current of 2 A is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. find self-inductance.	6M	4	2
	(ii) Determine the self-inductance of a coaxial cable.	6M	4	3
Q.6(A)	Determine the maxwell's equation in time varying fields with the suitable expression	12M	5	3
	OR			
Q.6(B)	Explain statically and dynamically induced EMF. Derive the expression for dynamically induced EMF due to conductor motion in a magnetic field.	12M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23EEE104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

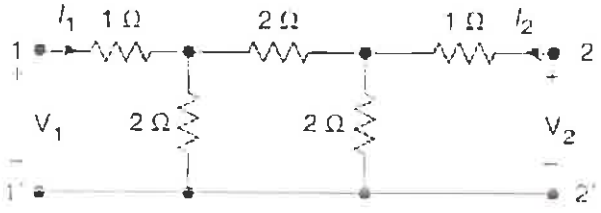
B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

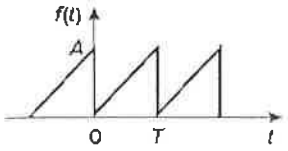
ELECTRICAL CIRCUIT ANALYSIS - II

(Electrical & Electronics Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define phase sequence in a three-phase system	1M	1	1
	ii.	State the relationship between line and phase voltages in a balanced star-connected load.	1M	1	1
	iii.	Determine the Laplace transform for f(t) = u(t).	1M	2	2
	iv.	Define the Laplace transform of a function.	1M	2	1
	v.	State the conditions for symmetry and reciprocity of a two-port network in terms of its impedance (Z) parameters.	1M	3	1
	vi	If Y-parameters of a two-port network are Y_{11} = 0.3 ℧; Y_{22} = 0.3 ℧ and $Y_{12} = Y_{21} = -0.2$ ℧, then determine the Z parameters.	1M	3	2
	vii.	Define harmonics in a periodic waveform	1M	4	1
	viii.	List the conditions under which a function can be represented by a Fourier series.	1M	4	
	ix.	State the characteristics of a low-pass filter	1M	5	1
	x.	What are Constant-k filters?	1M	5	1
Q.2(A)		A 400 V, 3 phase, 3 wire symmetrical system supplies a star connected load whose branch impedances are $Z_R = 5\sqrt{3} + j5\ \Omega$, $Z_Y = 10 + j10\sqrt{3}\ \Omega$ and $Z_B = -j5$. Take RYB Phase sequence. Using loop current method, determine the currents in each branch.	12 M	1	2
		OR			
Q.2(B)		The branch impedances of an unbalanced star connected load are: $Z_R = 20\angle 30^\circ\ \Omega$, $Z_Y = 20\angle -45^\circ\ \Omega$ and $Z_B = 40\angle 60^\circ\ \Omega$. It is connected across a balanced 3–phase, 3 wire supply of 200 V. Using Star- Delta Conversion technique, determine the line currents and voltage across each impedance.	12M	1	3
Q.3(A)		Apply Laplace Transform, to obtain the natural response and step response of a series RL circuit when switched at t = 0. Also obtain the voltage drop across the resistor and inductor.	12M	2	3
		OR			
Q.3(B)		Apply differential equation, to obtain the response of a series RC circuit when switched at t = 0 to an AC voltage source.	12M	2	4
Q.4(A)		Obtain the ABCD Parameters for the network shown. Also comment about the reciprocity and symmetry of the network. 	12M	3	3
		OR			
Q.4(B)		Obtain Z parameters in terms of Y, ABCD and h parameters.	12M	3	3
Q.5(A)		Determine the Trigonometric Fourier series of the sawtooth waveform and draw its amplitude and phase spectra.	12M	4	3



OR

Q.5(B)	Analyze how the presence of odd and even harmonics affects the waveform symmetry.	12M	4	4
Q.6(A)	Analyse a prototype high-pass filter with derivation of all necessary equations and also discuss the different characteristics of the filter.	12M	5	4

OR

Q.6(B)	Analyze the Constant K low pass filter (both T and π networks) and derive the related design parameters.	12M	5	3

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23EEE105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

DC MACHINES AND TRANSFORMERS

(Electrical & Electronics Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	List one application each for a DC shunt generator and a DC series generator.	1M	1	1
	ii.	What is the function of a commutator in a DC machine?	1M	1	1
	iii.	Draw the circuit diagram of a short shunt DC compound generator representing all the circuit parameters.	1M	2	1
	iv.	Which DC motor speed control method is generally used for constant power applications?	1M	2	1
	v.	Draw the phasor diagram of a single-phase transformer operating at unity power factor load.	1M	3	1
	vi	Why is the core of a transformer laminated?	1M	3	1
	vii.	Name the test used to determine the core losses (Iron losses) of a transformer.	1M	4	1
	viii.	What is the main drawback of parallel operation of two single-phase transformers with unequal voltage ratios?	1M	4	2
	ix.	What is the main function of an on-load tap changer in a transformer?	1M	5	2
	x.	List the four standard polyphase connections used in three-phase transformers.	1M	5	1
Q.2(A)		i) Explain the magnetization characteristic of a DC Shunt generator.	6M	1	3
		ii) A long shunt compound generator delivers load current of 50A at 500V and has armature, series field, and shunt field resistance of 0.05 Ω, 0.03 Ω and 250 Ω respectively. Calculate the generated voltage and armature current. Allow 1V per brush for contact drop.	6M	1	3
		OR			
Q.2(B)		Discuss the effect of armature reaction on the performance of a DC generator and propose methods to minimize its impact.	12M	1	4
Q.3(A)		i) Explain the different speed control methods of a D.C. Shunt motor.	6M	2	2
		ii) Explain the need for a starter and with a neat sketch explain the 3-point starter.	6M	2	2
		OR			
Q.3(B)		A 250V D.C. Shunt motor has armature resistance of 0.25 Ω. On load, it takes an armature current of 50A and runs at 750 r.p.m. If the flux of the motor is reduced by 10% without changing the load torque, find the new speed of the motor.	12M	2	3
Q.4(A)		(i) Derive and justify the *e.m.f.* equation of a single-phase transformer.	6M	3	4
		(ii) Explain different losses of a transformer and how they will be affected by voltage and frequency.	6M	3	
		OR			
Q.4(B)		i) Explain the principle and operation of a transformer on no-load and at load condition (lagging power factor).	6M	3	3

	ii) A Single-phase transformer has 400 primary and 1000 secondary turns. The net cross-sectional area of the core is 60cm². If the primary winding be connected to a 50Hz supply at 520V, calculate: i) the peak value of flux density in the core and ii) the voltage induced in the secondary winding.	6M	3	4
Q.5(A)	Obtain the equivalent circuit of a 200/400V, 1-phase, 50Hz, transformer given the following test results:	12M	4	4

O.C. Test:	200V	0.7A	70W	(on LV side)
S.C. Test:	15V	10A	85W	(on H.V. Side)

Calculate the secondary voltage when delivering 5kW at 0.8p.f lagging, the primary voltage being 200V.

OR

Q.5(B)	Discuss the advantages and limitations of performing Sumpner's test on transformers. How does this test help in determining the efficiency of transformers under different load conditions?	12M	4	4
Q.6(A)	Two transformers with equal turns have impedances of (0.5+j3) Ω and (0.6+j10) Ω respectively. If they are operated in parallel, determine how they will share a total load of 100kW at 0.8 power factor lagging. Also, comment on the result regarding the equal load sharing.	12M	5	3

OR

Q.6(B)	i) Explain the Scott connection (T-T connection) and analyze its function in converting three-phase to two-phase supply.	6M	5	2
	ii) Explain the operation of a three-winding transformer and list its main applications.	6M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23ME103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. TECH II Year I Semester (R23) Regular & Supplementary End Semester examinations, December - 2025

THERMODYNAMICS

(Mechanical Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S.No.		Question	Marks	CO	BL
1.	i)	State the Zeroth Law of Thermodynamics.	1	1	1
	ii)	What is the difference between a closed and open system?	1	1	1
	iii)	State the Kelvin–Planck statement of the Second Law of Thermodynamics.	1	2	1
	iv)	What is the principle of increase of entropy?	1	2	2
	v)	What are the axes in a T–s diagram?	1	3	1
	vi)	Define the Rankine cycle.	1	3	1
	vii)	What is meant by the principle of corresponding states?	1	4	2
	viii)	Define Joule–Thomson coefficient.	1	4	1
	ix)	Define psychrometric properties.	1	5	1
	x)	Define mole fraction.	1	5	1
2(A)	(i)	Derive the work done by a piston during constant pressure expansion.	12	1	3
		OR			
2(B)	(i)	A system receives 500 kJ of heat and does 200 kJ of work. Determine the change in internal energy of the system.	12	1	3
3(A)	(i)	A refrigerator operates between 250 K and 300 K. Find its coefficient of performance (COP).	12	2	2
		OR			
3(B)	(i)	Derive the Tds equations from the first and second laws of thermodynamics.	12	2	3
4(A)	(i)	Dry saturated steam at 10 bar expands isentropically to 1 bar. Determine the final dryness fraction and change in entropy.	12	3	3
		OR			
4(B)	(i)	In a reheat Rankine cycle, steam expands from 40 bar and 500°C to 5 bar, is reheated to 400°C, and finally expands to 0.05 bar. Determine the cycle efficiency.	12	3	3
5(A)	(i)	Derive the four Maxwell relations from the thermodynamic potentials.	12	4	3
		OR			
5(B)	(i)	An ideal gas expands from 0.1 m^3 to 0.3 m^3 at constant temperature of 300 K. Calculate the work done if the gas constant is 0.287 kJ/kg·K and mass = 1 kg.	12	4	3
6(A)	(i)	Differentiate between sensible heating and latent heating processes on a psychrometric chart.	12	5	2
		OR			
6(B)	(i)	Air at 30°C DBT and 60% RH is passed over a cooling coil until the air becomes saturated at 20°C. Determine the amount of moisture removed per kg of dry air.	12	5	3

*****END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23ME104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

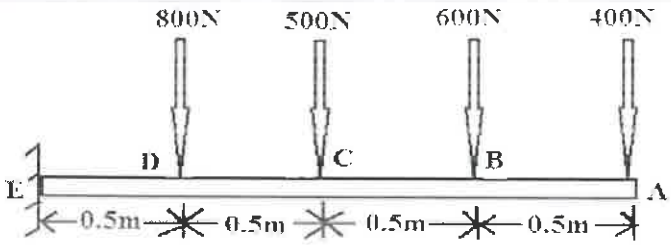
MECHANICS OF SOLIDS

(Mechanical Engineering)

Time: 3Hrs **Max Marks: 70**

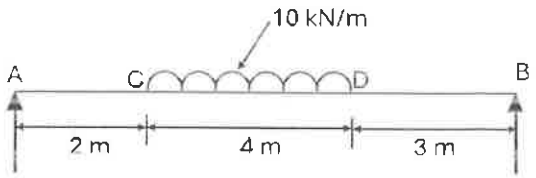
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What do you mean by modulus of rigidity?	1M	1	1
	ii.	List the name of different elastic constants.	1M	1	1
	iii.	State the definition of shear force for a beam	1M	2	1
	iv.	Define point of contrafluture	1M	2	1
	v.	Express the bending equation for a beam subjected to pure bending	1M	3	1
	vi	Express the formula of tortional rigidity.	1M	3	1
	vii.	State the deflection of beam.	1M	4	1
	viii	What is the formula for polar section modulus.	1M	4	1
	ix.	Define thick and thin cylindricalshell.	1M	5	1
	x.	What do you mean by hoop stress subjected to thin cylinder?	1M	5	1
Q.2(A)		Draw and explain the concept of stress and strain with the help of a neat diagram for mild steel.	12M	1	3
		OR			
Q.2(B)		A rod is 3 m long exposed under a temperature of 20°C. Find the expansion of the rod, when the temperature is raised to 80°C. If this expansion is prevented, find the stress induced in the material of the rod. Take E = 1.0 × 10^5 MN/m^2 and α = 0.000012 per degree centigrade.	12M	1	3
Q.3(A)		A cantilever beam of length 2m carrying point loads at different positions on the beam as shown in Figure. Draw Shear force and bending moment diagram for given beam.	12M	2	3

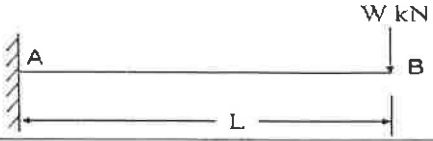


OR

Q.3(B)		Draw the shear force and bending moment diagram for a simply supported beam of length 9 m and carry a uniformly distributed load of 10 kN/m for a distance of 4 m as shown in figure	12M	2	3



Q.4(A)		Derive the following bending equation subjected to a beam: $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$	12M	3	4
		OR			

Q.4(B)	A simply supported beam of span 7 m carries a shear force of 5200 N at a particular cross-section. The beam has a rectangular cross-section of width 150 mm and depth 200 mm. Analyze and determine the shear stress at a point located 50 mm above the neutral axis.	12M	3	3
Q.5(A)	Prove the torsion equation for a shaft: $\frac{T}{J} = \frac{\tau}{R} = \frac{G\theta}{L}$	12M	4	4
	OR			
Q.5(B)	Derive the expression for maximum deflection and maximum slope of given cantilever beam. 	12M	4	4
Q.6(A)	A Cylindrical pipe of diameter 2 m and thickness of 200 mm is subjected to an internal fluid pressure of 1.6 N/mm². Analyze the given condition and estimate, whether it is thin or thick cylinder. On the given data and condition determine: (I) Longitudinal stress developed in the pipe (II) Circumferential stress developed in the pipe.	12M	5	4
	OR			
Q.6(B)	Analyze the deflected shapes due to buckling under the compressive load in the column subjected to different end conditions with neat diagram. Also, determine the equivalent length of the column under each end conditions.	12M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23ME105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

MATERIALS SCIENCE AND ENGINEERING

(Mechanical Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Draw a neat sketch of FCC crystal structure	1M	1	1
	ii.	Define Phase Rule	1M	1	1
	iii.	Write a note on Low Alloy Steel	1M	2	1
	iv.	What are the different plain carbon steels?	1M	2	1
	v.	Outline time-temperature transformation (TTT) diagram	1M	3	1
	vi	Annealing a metal lead to increase or removes its internal strains.	1M	3	1
	vii.	What are the different types of compaction methods in powder metallurgy	1M	4	1
	viii.	Why sintering carried out in controlled atmosphere furnace	1M	4	1
	ix.	Define about composite material?	1M	5	1
	x.	How smart materials differs from biomaterials	1M	5	1
Q.2(A)		With a suitable sketch explain in detail about HCP and FCC structure.	12M	1	2
		OR			
Q.2(B)		Explain with neat sketch the mechanism for dislocation and twinning.	12M	1	2
Q.3(A)		What are stainless steels? What are the main characteristics of stainless steels? Name different types of stainless steels and their main applications	12M	2	2
		OR			
Q.3(B)		Explain in detail about structural properties of copper and its alloys?	12M	2	2
Q.4(A)		What is Hardening? Discuss in detail on different hardening methods and mechanism. Compare hardening and annealing.	12M	3	2
		OR			
Q.4(B)		Explain the below i) Tempering ii) Hardenability	12M	3	2
Q.5(A)		Describe in detail any method by which powders suitable for powder metallurgy can be produced.	12M	4	2
		OR			
Q.5(B)		With suitable sketch how compaction is performed using die pressing	12M	4	2
Q.6(A)		How are plastic materials classified? Explain any three.	12M	5	2
		OR			
Q.6(B)		Enumerate the difference between the particle and Reinforced composite	12M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23ECE102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

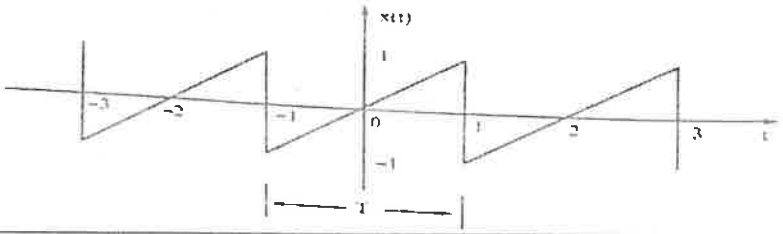
B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

SIGNALS AND SYSTEMS

(Electronics & Communication Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define energy and power signals.	1M	1	2
	ii.	Sketch the Continuous time signal given by: $u(t) - u(t-6)$	1M	1	2
	iii.	Evaluate the Fourier transform of $x(t)= e^{-at}u(t)$.	1M	2	2
	iv.	Solve the following: Laplace transform of $\delta(t)$ and $u(t)$.	1M	2	2
	v.	What is distortion less transmission?	1M	3	1
	vi	Define a LTI system.	1M	3	1
	vii.	Define stationary random process?	1M	4	2
	viii.	Write an example of a probability density function (PDF)	1M	4	2
	ix.	What is power spectral density?	1M	5	1
	x.	Draw a model graph to visualize cross-power spectral density.	1M	5	2
Q.2(A)	i)	Identify whether the system $y(n) = \log\lvert x(n)\rvert$ is a) Static or dynamic b) Linear or non-Linear c) Causal or non-causal d) Time variant or invariant e) Stable or un-stable	12M	1	3
	ii)	Sketch the following signal a) $u(t+2)-u(t-3)$ b) $r(t)-2r(t+3)+r(t-1)$ c) $e^{-3t}u(t)$			
		OR			
Q.2(B)		Consider the periodic square wave f(t) shown in the following figure. Determine the trigonometric Fourier series of f(t).	12M	1	3
					
Q.3(A)	i)	Define the Continuous-Time Fourier Transform (CTFT) and write its inverse formula. Derive the Fourier Transform of the following signals: a) $x(t) = e^{-at}u(t)$, $a> 0$ b) $x(t) = \cos(\omega_0 t)$	12M	2	3
	ii)	State and explain any six important properties of the CT Fourier Transform with examples.			
		OR			
Q.3(B)		Using Partial fraction expansion find inverse Fourier transform for a) $X(j\Omega) = \frac{5j\Omega+12}{(j\Omega^2)+5j\Omega+6}$ b) $X(j\Omega) = \frac{1+2j\Omega}{(j\Omega+2)^2}$	12M	2	3
Q.4(A)		Find the convolution of two signal: (i)$tu(t) * u(t)$ (ii) $e^{-at}u(t) * e^{-bt}u(t)$ and (iii) $u(t) * u(t)$	12M	3	3
		OR			

Q.4(B)	i) Explain in detail the properties of convolution. ii) Find whether the following system with impulse responses h(t) are stable or not a) $h(t)=\frac{1}{RC}e^{-t/RC}u(t)$ b) $h(t)=te^{-t}u(t)$ c) $h(t)=e^{2t}u(t-1)$	12M	3	3
Q.5(A)	Explain the autocorrelation function for a random process and describe its properties.	12M	4	3
	OR			
Q.5(B)	The *pdf* of a uniform random variable is given as: $f(x,y)=\frac{1}{24},\quad 0\le x\le 8,\ 0\le y\le 3$ $=0,\ elsewhere$ Find the means of x, y and E[XY].	12M	4	3
Q.6(A)	i) Write the properties of cross-power spectral density (CPSD). Explain the relationship between cross-power spectrum and cross-correlation function using mathematical illustrations. ii) Consider the random process $X(t)=A\cos(\omega t+\phi)$ .Find a) The average power P_{XX} in x(t). a) Power density spectrum $S_X(\omega)$	12M	5	3
	OR			
Q.6(B)	Two statistically independent zero mean random processes X(t) and Y(t) have autocorrelation functions $R_{XX}(\tau)=e^{-\lvert\tau\rvert}$ *and*, $R_{YY}(\tau)=\cos(2\pi\tau)$ a) Find the autocorrelation function of the sum $W_1(t)=X(t)+Y(t)$ b) Find the autocorrelation function of the difference $W_2(t)=X(t)-Y(t)$ Find the cross-correlation functions of $W_1(t)$ and $W_2(t)$. ***** END*****	12M	5	3

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23ECE103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

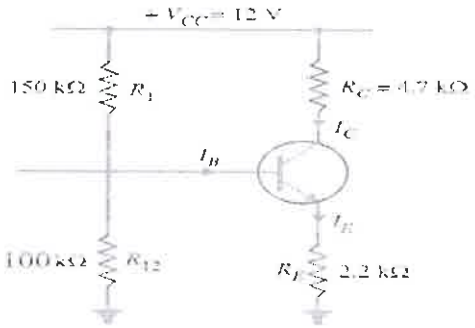
ELECTRONIC DEVICES AND CIRCUITS

(Electronics & Communication Engineering)

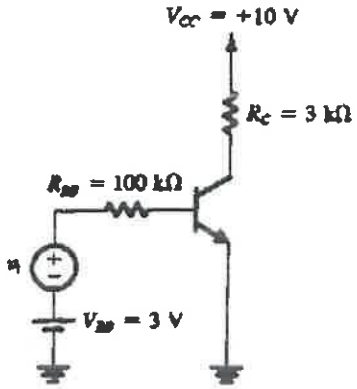
Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What is the cut in voltage of the PN junction diode and draw the symbol of the PN junction diode.	1M	1	1
	ii.	Define Zener breakdown.	1M	1	1
	iii.	Define Early Effect.	1M	2	1
	iv.	What is meant by channel length modulation?	1M	2	1
	v.	Distinguish between BJT and FET.	1M	3	1
	vi	Why is MOSFET called a voltage-controlled device?	1M	3	1
	vii.	Why is the CE amplifier considered a good voltage amplifier?	1M	4	1
	viii	Why is it important to separate DC and small signal analysis?	1M	4	1
	ix.	Why do we choose Q point at the center of the load line?	1M	5	1
	x.	A CS amplifier with source resistance has Rs =500 Ω, g_m= 4 mS and R_D = 10kΩ. Find the voltage gain.	1M	5	2
Q.2(A)		Illustrate the energy band diagrams of a PN junction diode under no bias, forward bias, and reverse bias conditions, and explain the movement of charge carriers in each case.	12M	1	2
		OR			
Q.2(B)		i) Explain the operation of a centre-tapped full-wave rectifier using a labelled circuit diagram and waveforms.	6M	1	2
		ii) Calculate the value of a capacitance to use in a capacitor filter to a full wave rectifier operating at a standard aircraft power frequency of 400Hz if the ripple factor is 10% for a load of 100 Ω.	6M	1	3
Q.3(A)		Demonstrate the input and output characteristics of a transistor in the Common Emitter configuration (CE) and show how they influence its performance as an amplifier.	12M	2	2
		OR			
Q.3(B)		For the circuit of potential divider biasing shown in Figure, (a) Find the operating point. (b) What is the stability factor of the circuit. Assume that β = 50 and V_{BE} = 0.7V.	12M	2	3



Q.4(A)		Explain the construction and operation of an n-channel E-MOSFET and interpret its characteristics in the cut-off, triode, and saturation regions.	12M	3	2
		OR			

Q.4(B)	An NMOS transistor is fabricated in a 0.13-μm CMOS process with L = 1.5Lmin and W = 1.3 μm. The process technology is specified to have tox = 2.7 nm, μn = 400 cm2/V·s, and Vtn = 0.4V. (a) Find Cox, k'n, and kn. (b) Find the overdrive voltage V_{OV} and the minimum value of V_{DS} required to operate the transistor in saturation at a current I_D = 100 μA. What gatetosource voltage is required?	12M	3	3
Q.5(A)	Apply the simplified π model to derive and compute the input resistance, output resistance, and voltage gain for a Common Emitter amplifier (CE).	12M	4	3
	OR			
Q.5(B)	Analyse the transistor amplifier shown below and determine its voltage gain using small signal equivalent model. Assume $\beta = 100$. 	12M	4	3
Q.6(A)	Derive expressions for the input resistance, output resistance, and voltage gain of a Common Source amplifier (CS) using the small-signal equivalent model.	12M	5	3
	OR			
Q.6(B)	A CS amplifier utilizes a MOSFET biased at I_D = 0.25mA with V_{OV}= 0.25 V and R_D = 20kΩ. The device has VA = 50V. The amplifier is fed with source having Rsig = 100kΩ and a 20 KΩ load is connected to the output. Find Rin, Avo, Ro, Av and Gv.	12M	5	3

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23ECE104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

DIGITAL CIRCUITS DESIGN

(Electronics & Communication Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Convert decimal $(153)_{10}$ to equivalent octal number system	1M	1	1
	ii.	Subtract using 2's complement 45-22	1M	1	1
	iii.	State the benefits of using a Carry Look-Ahead Adder in digital systems.	1M	2	1
	iv.	Compare Verilog and VHDL	1M	2	1
	v.	What are the primitive gates supported by Verilog HDL	1M	3	1
	vi	What is the operation of D flip-flop?	1M	3	1
	vii.	What is shift register and list the types of shift register.	1M	4	1
	viii.	Tabulate the Excitation Table of a SR Flip Flop.	1M	4	1
	ix.	What are the different types of FSM	1M	5	1
	x.	What is sequence detector	1M	5	1
Q.2(A)		Simplify the given SOP expression using K-map and implement the minimized function using suitable logic gates. $F(A, B,C,D,E) = \Sigma_m (0,2,4,6,9,11,13,15,17,21,25,27,29,31)$	12M	1	2
		OR			
Q.2(B)		i) Express the following numbers in decimal form: (a) $(10110.0101)_2$ (b) $(64.24)_8$ (c) $(BECE.E)_{16}$ (ii) Perform the following using BCD arithmetic operation. (a) $(79)_{10} + (167)_{10}$ (b) $(461)_{10} + (178)_{10}$	12M	1	2
Q.3(A)		Design a 3-to-8 decoder using logic gates. Draw the truth table and explain the operation.	12M	2	2
		OR			
Q.3(B)		Design and implement a single digit BCD adder using a 4-bit binary adder circuit.	12M	2	2
Q.4(A)		Explain behavioural statement with an example in Verilog HDL?	12M	3	3
		OR			
Q.4(B)		Define multiplexer and implement 8:1 Mux with Verilog code using case statement.	12M	3	2
Q.5(A)		Explain the working of a Master-Slave JK Flip-Flop with the help of a timing diagram.	12M	4	3
		OR			
Q.5(B)		Design a 4-bit Synchronous Counter using T Flip-Flops. Draw its circuit Diagram and demonstrate its operation with a timing diagram.	12M	4	2
Q.6(A)		Implement the following Boolean function using PAL (i) $F(A, B, C, D) = \sum m(0,1,3,5,6,8,9,11,12,13)$ (ii) $F(A, B, C, D) = \sum m(1,2,8,12,13)$	12M	5	3
		OR			
Q.6(B)		Explain the basic architecture of FPGA? What are the advantages of FPGAs.	12M	5	3

*** END***

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSE104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

(Computer Science & Engineering)

Time: 3Hrs **Max Marks: 70**

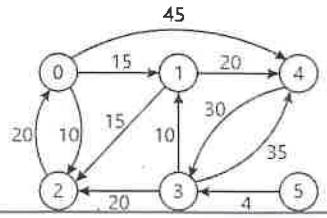
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Which rotation is performed when an insertion in AVL Tree causes Left-Right imbalance?	1M	1	1
	ii.	For a B-Tree of order 5, what is the minimum number of keys in the root?	1M	1	1
	iii.	List out the **properties** of a heap.	1M	2	2
	iv.	State the purpose of Strassen's matrix multiplication algorithm.	1M	2	1
	v.	Which algorithm is used for finding the shortest path from a single source to all vertices with positive edge weights?	1M	3	1
	vi	What is the principle used in 0/1 Knapsack dynamic programming approach?	1M	3	1
	vii.	In Graph Coloring problem, what condition must hold true for adjacent nodes?	1M	4	1
	viii.	Which type of search tree is typically generated in backtracking algorithms?	1M	4	1
	ix.	What does polynomial-time reduction imply?	1M	5	1
	x.	Define NP-Hard problems.	1M	5	1
Q.2(A)		i) Explain the asymptotic notations with suitable example.	6M	1	3
		ii) Compute the theta notation for $5n^3+n^2+3n+2$	6M		
		OR			
Q.2(B)		Construct a B-Tree of order 3 by inserting numbers 1 to 10.	12M	1	4
Q.3(A)		Apply the Quick Sort algorithm for the following array: A = {20, 10, 80, 30, 60, 50, 40, 70}. Show the partitioning process at each step and the pivot movements.	12M	2	4
		OR			
Q.3(B)		Given the array {18, 5, 25, 3, 12, 40}, construct a Min Heap and Max Heap. Show intermediate steps and explain the heapify process.	6M 6M	2	3
Q.4(A)		Consider the following set of items and a knapsack of maximum capacity 8 kg. Solve the 0/1 Knapsack problem using Dynamic Programming and find the maximum profit from the below table.	12M	3	4

Item	Weight (Wi)	Profit (Pi)
1	3	2
2	4	3
3	5	4
4	6	1

OR

Q.4(B)	Apply Single Source Shortest Path Algorithm using Greedy Method to find the shortest path from vertex 0 to all other vertices.	12M	3	4



Q.5(A)	Explain in detail about graph coloring with an example.	12M	4	3
	OR			
Q.5(B)	Apply the Backtracking approach to find the maximum profit obtainable without exceeding the knapsack capacity. Knapsack Capacity (m) = 15	12M	4	4

Item	Weight (Wi)	Profit (Pi)
1	4	8
2	6	10
3	5	12
4	3	6

Q.6(A)	i)State Cook's Theorem and explain.	6M	5	3
	ii)Explain the significance of Cook's Theorem in computational complexity theory.	6M	5	3
	OR			
Q.6(B)	Explain in detail P, NP, NP Hard and NP Complete Problems.	12M	5	3

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSE105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(Computer Science & Engineering)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What are the principles of Object-Oriented Programming?	1M	1	1
	ii.	Define and provide an example of type casting in Java.	1M	1	1
	iii.	Point out the significance of 'this' keyword	1M	2	1
	iv.	List out access modifiers in JAVA.	1M	2	1
	v.	Does Java support multiple inheritance? Justify your answer	1M	3	1
	vi	How does a subclass invoke its superclass's constructor?	1M	3	1
	vii.	Define auto-boxing and auto-unboxing	1M	4	1
	viii.	Does importing a package imports the sub packages as well?	1M	4	1
	ix.	Name the methods used by Java for interprocess communication to avoid polling	1M	5	1
	x.	Discuss any 4 string methods in StringBuffer class	1M	5	1
Q.2(A)		Distinguish in detail about various control statements are used in Java with suitable example program	12M	1	2
		OR			
Q.2(B)		Describe the following: i. Primitive Data Types in Java. ii. Write a JAVA Program to demonstrate the use of command line arguments.	6M 6M	1 1	2 2
Q.3(A)		Demonstrate how a constructor initializes object attributes. Create a class Book with attributes title and price. Create a parameterized constructor to initialize these attributes and create multiple Book objects to display their details.	12M	2	3
		OR			
Q.3(B)		Write a program to perform the following functions using classes, methods, objects and constructors where it is essential. (a) Get as input the marks of 5 students in 5 subjects. (b) Calculate the total and average. (c) Print the formatted result on the screen.	12M	2	3
Q.4(A)		Demonstrate the use of the super keyword in Java. Write a program that shows how super can be used to access the superclass constructor and methods.	12M	3	3
		OR			
Q.4(B)		What are interfaces? Illustrate how interfaces can be used for implementing multiple inheritance.	12M	3	3
Q.5(A)		What is the role of try, catch, and finally blocks in Java exception l Illustrate with an example program that includes multiple catcl Analyze the sequence of execution in normal scenarios and when e are thrown.	12M	4	2
		OR			
Q.5(B)		Define packages. How do you import a package in Java? Explain with	12M	4	2

	suitable example			
Q.6(A)	(i) Discuss the different states of thread in detail.	6M	5	2
	(ii) Write a Java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints it. If the value is odd, the third thread will print the value of cube of the number.	6M	5	2
	OR			
Q.6(B)	Explain the following statement "StringBuffer class create mutable stings". Explain about StringBuffer class. Compare String class with StringBuffer class.	12M	5	3

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CST102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

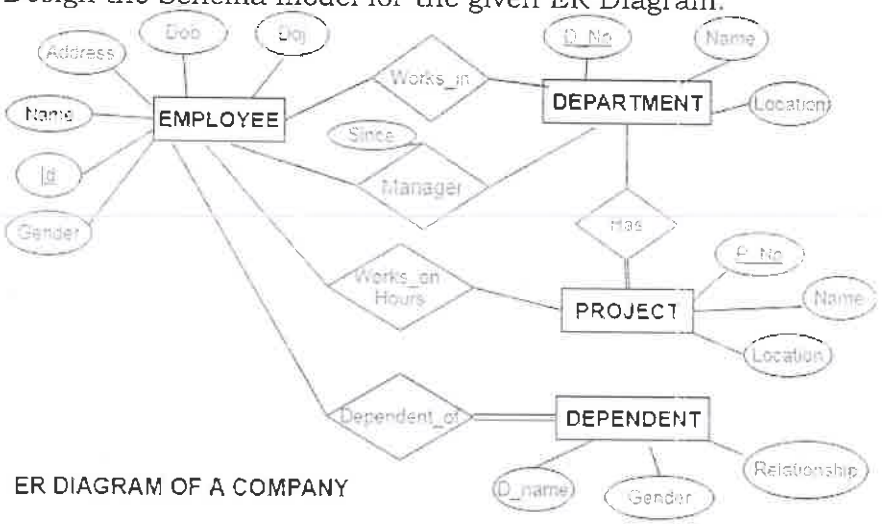
DATABASE MANAGEMENT SYSTEMS

(Computer Science & Technology)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define an entity set with an example.	1M	1	1
	ii.	Mention two drawbacks of using a traditional file system.	1M	1	1
	iii.	What is the difference between delete and drop command?	1M	2	1
	iv.	Write an SQL statement to increase the salary of employee 'E1' from 500 to 5000.	1M	2	1
	v.	What is Trivial Functional Dependency?	1M	3	1
	vi	Difference between 3NF and Boyce-Codd Normal Form (BCNF)?	1M	3	1
	vii.	What is the main difference between B-tree and B+-tree?	1M	4	1
	viii	What are the different types of two-phase locking protocols?	1M	4	1
	ix.	Define ACID Properties.	1M	5	1
	x.	What are two common problems faced during database recovery?	1M	5	1
Q.2(A)		Design the Schema model for the given ER Diagram.	12M	5	3



ER DIAGRAM OF A COMPANY

OR

Q.2(B)		Explain Database Architecture with neat diagram.	12M	1	2
Q.3(A)		Construct SQL queries for the flight ticket reservation system database with required constraints: i. Retrieve all data from the tables Passenger, Flight, and Reservation. ii. Display the passenger ID and booking date of passengers who booked tickets between 01-01-2024 and 30-06-2024. iii. Show all flights where the ticket price is greater than 10,000. iv. Display the name and ticket price of passengers who are traveling in flight number 'FL123'. Use an alias for the passenger name column.	12M	2	3

OR

Q.3(B)	Apply JOIN concept and implement the following SQL queries: a) Design two tables Student(student_id, name, dob and dept_id) b) and Department(dept_id, and dept_name). Ensure appropriate primary and foreign key constraints are applied. c) Insert sample data into Student and Department such that at least one student does not belong to any department, and at least one department has no students. d) Retrieve student id, names and dob of all students who are assigned to a department. Use INNER JOIN and ensure that only students with a valid department are displayed. e) Display all students, including those who don't belong to any department using LEFT JOIN. f) Retrieve all departments, including those department have no students using RIGHT JOIN. As part of a data audit, the University wants a complete report of all students and all departments whether they are linked or not. Write a query to produce this list. Which JOIN operation is suitable, and why is it different from INNER, LEFT, or RIGHT JOIN?	12M	2	3
Q.4(A)	i) Given the relational schema STUDENT(ID, Name, AdvisorID, AdvisorName, Course), which is not normalized, explain and illustrate the various Update Anomalies (Insertion, Deletion, and Modification) that can occur.	6M	3	2
	ii) What is Boyce-Codd Normal Form (BCNF)? Evaluate a relational schema to determine if it is in BCNF, and if not, show the decomposition into BCNF.	6M	3	4
	OR			
Q.4(B)	Define Functional Dependency and explain the Guidelines for Relational Schema Design. Discuss the importance of Dependencies Preservation and Lossless Join Decomposition during the decomposition process.	12M	3	3
Q.5(A)	Explain the different types of database recovery mechanism.	12M	4	2
	OR			
Q.5(B)	Analyze the process of constructing multi-level indexes with the help of B-tree structures and discuss how they improve database search efficiency.	12M	4	3
Q.6(A)	i) Explain the CAP Theorem in detail. Discuss the trade-offs involved in designing a distributed system based on this theorem.	6M	5	2
	ii) Analyze a scenario and justify whether a Fully Replicated or a Partitioned allocation technique would be more suitable.	6M	5	3
	OR			
Q.6(B)	Introduce NoSQL Systems and explain the motivations behind their development. Differentiate between the key features of Relational Databases and NoSQL Databases.	12M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CST101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(Computer Science & Technology)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define and provide an example of type casting in Java.	1M	1	1
	ii.	Write the difference between static variable and instance variable.	1M	1	1
	iii.	How do you create an object in Java?	1M	2	1
	iv.	Define method overloading.	1M	2	1
	v.	Explain the purpose of the super keyword.	1M	3	1
	vi	What are the types of Exceptions in Java?	1M	3	1
	vii.	How can you directly access all classes in the packages?	1M	4	1
	viii	What is character stream in Java? list some of the character stream classes.	1M	4	1
	ix.	Define the term "immutable" in the context of Java strings.	1M	5	1
	x.	What is synchronization and why is it important?	1M	5	1
Q.2(A)		(i) Write a program that accepts numbers as command-line arguments and prints only the prime numbers among them.	6M	1	3
		(ii) Write a Java program that takes a user's name and age as input and displays a greeting message.	6M	1	3
		OR			
Q.2(B)		Explain in detail about OOP concepts.	12M	1	2
Q.3(A)		Design a Java program to implement a BankAccount class with attributes accountNumber, balance, and methods deposit() and withdraw(). Ensure the balance never goes below zero. Demonstrate the class using appropriate test cases.	12M	2	3
		OR			
Q.3(B)		Differentiate between constructor and method of class. Write a program to demonstrate the constructor overloading.	12M	2	2
Q.4(A)		(i) Create an abstract class Shape with an abstract method calculateArea(). Implement this class in two subclasses, Circle and Rectangle, to calculate areas based on their respective formulas.	6M	3	3
		(ii) Write a Java program to demonstrate runtime polymorphism.	6M	3	3
		OR			
Q.4(B)		Write a Java program to create and implement an interface Calculator with methods for basic arithmetic operations. Create a class Basic Calculator that implements this interface.	12M	3	3
Q.5(A)		Explain the following clause in Exception Handling with proper Syntax :(i) try (ii) catch (iii) throw (iv) throws (v) finaly	12M	4	2
		OR			

Q.5(B)	Write a program to read and write in file using FileInputStream & FileOutputStream Class	12M	4	3
Q.6(A)	Write a program to count the number of vowels, consonants, digits, and special characters in a string using the String class.	12M	5	3
	OR			
Q.6(B)	Write a Java program to implement multithreading by creating threads that print numbers from 1 to 10 and their squares simultaneously.	12M	5	3

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CAI101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

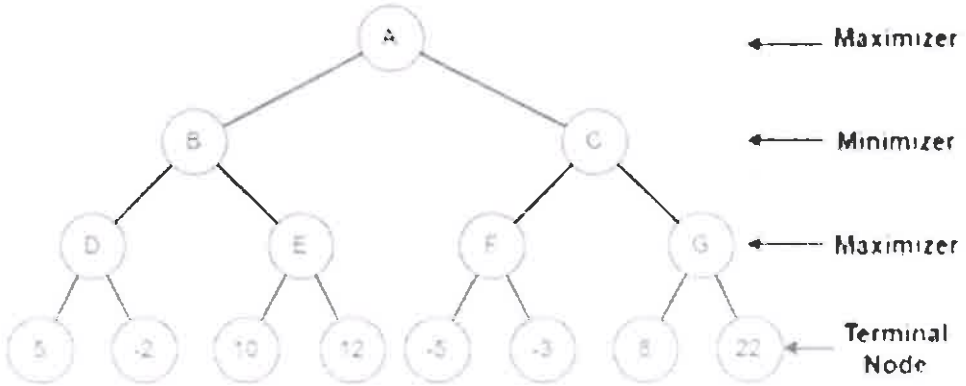
PRINCIPLES OF ARTIFICIAL INTELLIGENCE

(CSE- Artificial Intelligence)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define rational agent.	1M	1	1
	ii.	List the various types of agents.	1M	1	1
	iii.	State the data structure that can be used to implement DFS.	1M	2	1
	iv.	What is Min–Max Strategy?	1M	2	1
	v.	Why does uncertainty arise?	1M	3	1
	vi	List the various techniques of Knowledge representation.	1M	3	1
	vii.	Define resolution.	1M	4	1
	viii	Write the Propositional vs. First Order Inference.	1M	4	1
	ix.	What is MYCIN?	1M	5	1
	x.	What is the purpose of the user interface?	1M	5	1
Q.2(A)		With neat diagram, explain how Learning agent differs from other types of agents.	12M	1	4
		OR			
Q.2(B)		State the PEAS factors for the following: a. Taxi Driver b. Part-picking robot c. Interactive English Tutor d. Playing Soccer e. Knitting a sweater f. Playing Tennis g. Bidding on an item at an auction h. Performing high jump i. Medical diagnosis system j. Satellite image analysis system	12M	1	3
Q.3(A)		Apply Alpha-Beta Pruning for given diagram.	12M	2	4



OR

Q.3(B)		Construct and demonstrate the working of the Depth First Search (DFS) algorithm using a neat diagram and step-by-step explanation of its traversal process.	12M	2	4
Q.4(A)		Explain the syntax and semantics of Predicate Logic, including the use of predicates, Logical Connectives and variables.	12M	3	3

	OR			
Q.4(B)	Discuss the Rule-based Deduction Systems with an example	12M	3	2
Q.5(A)	Analyze the working mechanism of Reinforcement Learning through its elements.	12M	4	3
	OR			
Q.5(B)	Compare and contrast Propositional and First-Order logic. In your answer be sure to include examples of each type of logic.	12M	4	4
Q.6(A)	Apply the concept of expert systems to explain how they can be utilized in solving Agriculture problems.	12M	5	3
	OR			
Q.6(B)	Develop a diagrammatic representation of an Expert System, identifying and explaining its major components.	12M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CAI102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

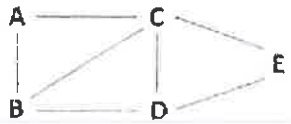
ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

(CSE-Artificial Intelligence)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Write the properties of B-tree.	1M	1	1
	ii.	Which asymptotic notation represents the upper bound of an algorithm?	1M	1	1
	iii.	Define Minimum Spanning Tree.	1M	2	1
	iv.	How does the divide and conquer approach differ from the greedy approach?	1M	2	1
	v.	Mention the purpose of the Bellman-Ford algorithm.	1M	3	1
	vi	How does dynamic programming solve the 0/1 Knapsack problem?	1M	3	1
	vii.	What is backtracking in algorithm design?	1M	4	1
	viii.	List any two applications of the Travelling Salesperson problem.	1M	4	1
	ix.	What does Cook's Theorem state?	1M	5	1
	x.	What is the importance of NP-Complete problems in computational complexity?	1M	5	1
Q.2(A)		Explain how a B-Tree of order 4 is constructed step-by-step for the elements: 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100.	12M	1	2
		OR			
Q.2(B)		Describe Breadth First traversal (BFT) algorithm and Find out BFT order for the below graph.	12M	1	2

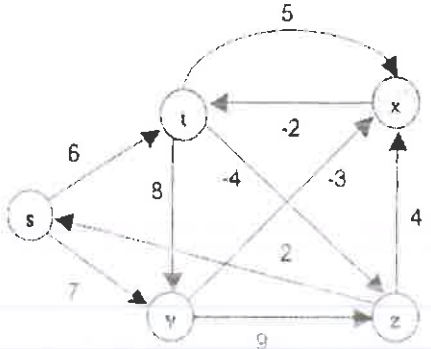


Q.3(A)		Use the Greedy Method to solve the Job Sequencing Problem with deadlines.	12M	2	2

Job	J1	J2	J3	J4	J5	J6
Deadline	2	1	2	1	3	3
Profit	100	19	27	25	15	30

OR

Q.3(B)	Discuss Prim's Algorithm for finding the Minimum Spanning Tree with a step-by-step example.	12M	2	3
Q.4(A)	Apply Bellman-Ford Algorithm to find the shortest paths from a single source to all other vertices for the following graph.	12M	3	3



OR

Q.4(B)	Apply Dynamic Programming to solve the 0/1 Knapsack problem by considering the Profits (P_i) = (10, 15, 40, 30), Weights (W_i)= (2,3,5,4) and Knapsack Capacity (M)=7.	12M	3	3
Q.5(A)	Solve N-Queens problem using back tracking by taking N=4.	12M	4	3

OR

Q.5(B)	Discuss how Branch and Bound can solve the 0/1 Knapsack Problem for the following data with Knapsack capacity M=5.	12M	4	3

Item	1	2	3	4
Profit	40	100	50	60
Weight	2	3	1	4

Q.6(A)	Discuss the classes P, NP, and NP-Complete. Provide examples and explain their significance in computational complexity.	12M	5	2

OR

Q.6(B)	Discuss the Job Shop Scheduling with suitable example.	12M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CAI104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

DATABASE MANAGEMENT SYSTEMS

(CSE- Artificial Intelligence)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define cardinality.	1M	1	1
	ii.	Mention the usage of a primary key in the context of the ER model	1M	1	1
	iii.	List out TCL commands in SQL	1M	2	1
	iv.	What does JDBC stand for?	1M	2	1
	v.	What is TRC and DRC?	1M	3	1
	vi	What is Functional Dependency?	1M	3	1
	vii.	Mention the recovery techniques in Database.	1M	4	1
	viii.	Define hashing in the context of database storage.	1M	4	1
	ix.	List the advantages of NoSQL databases	1M	5	1
	x.	Compare SQL and NoSQL databases	1M	5	2
Q.2(A)		Examine how each component interacts in the database architecture.	12M	1	4
		OR			
Q.2(B)		Design an ER diagram for a university database system, including entities, relationships, attributes, and constraints. Explain the design choices	12M	1	4
Q.3(A)		Explain the use of SQL functions in manipulating data. Discuss the following categories of functions with examples: a) Date and Time Functions b) String Functions c) Aggregate Functions	12M	2	2
		OR			
Q.3(B)		Explain the purpose of a trigger in a database.	12M	2	2
Q.4(A)		Apply relational algebra operations to retrieve data from relations and explain its various operators with examples.	12M	3	3
		OR			
Q.4(B)		Apply the concept of Functional Dependencies to explain how they are used in the Normalization process with suitable examples.	12M	3	3
Q.5(A)		Construct the B+ tree with 10 nodes – order 3. Interpret the insert Operation of each node.	12M	4	4
		OR			
Q.5(B)		Examine timestamp-based and lock-based concurrency control techniques and discuss their strengths and weaknesses.	12M	4	4
Q.6(A)		Discuss the importance of Authentication and Authorization in database systems. How do they contribute to maintaining database security?	12M	5	4
		OR			
Q.6(B)		Inspect the necessity for the CAP theorem in a distributed database architecture? Explain each one in detail	12M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSD101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

DATABASE SYSTEMS

(CSE-Data Science)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define Database Management Systems.	1M	1	1
	ii.	What are the components of an ER diagram?	1M	1	1
	iii.	Recall the dynamic SQL.	1M	2	1
	iv.	Explain the aggregate operators.	1M	2	2
	v.	How does relational calculus differ from relational algebra?	1M	3	1
	vi	Recall the relational algebra?	1M	3	1
	vii.	List the recovery techniques.	1M	4	1
	viii.	Explain the main goal of concurrency control in database systems?	1M	4	2
	ix.	List the three components of the CAP theorem?	1M	5	1
	x.	Recall the DAC stand for in access control models?	1M	5	1
Q.2(A)		i) Explain DBMS architecture with a neat sketch. ii) Draw the E-R diagram of Library Management System.	12M	1	2
		OR			
Q.2(B)		Consider a university database for the scheduling of classrooms for final exams. This database could be modeled as the single entity set exam, with attributes course-name, section-number, room-number, and time. Alternatively, one or more additional entity sets could be defined, along with relationship sets to replace some of the attributes of the exam entity set, as: (i). course with attributes name, department, and c-number (ii). section with attributes s-number and enrollment, and dependent as a weak entity set on course (iii). room with attributes r-number, capacity, and building. (iv) Show an E-R diagram illustrating the use of all three additional entity sets listed.	12M	1	4
Q.3(A)		What are aggregate operators in SQL? Explain their use with examples of SUM, AVG, and COUNT.	12M	2	2
		OR			
Q.3(B)		i)Give a brief introduction to JDBC and explain how it is used to interact with databases from Java applications. ii) Explain the concept of views and indexes in SQL. How do they improve database functionality and performance?	12M	2	3
Q.4(A)		Consider the relational schema R(A,B,C,D,E,F,G,H,I,J) and the set of functional dependencies F={ AB→C, A→DE, B→F, F→GH}: i. Find {AB}+ ii. Find key for R	12M	3	4
		OR			
Q.4(B)		Explain 1NF, 2NF and 3NF with suitable examples.	12M	3	2
Q.5(A)		Describe the concepts of transaction atomicity and durability.	12M	4	3
		OR			

Q.5(B)	Describe the structure of a B-tree and explain how it supports efficient search, insertion, and deletion operations.	12M	4	3
Q.6(A)	Define Discretionary Access Control (DAC). What are its characteristics, advantages, and potential limitations?	12M	5	2
	OR			
Q.6(B)	Explain Mandatory Access Control (MAC) in the context of database security. How does it differ from DAC?	12M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSD102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

DESIGN AND ANALYSIS OF ALGORITHMS

(CSE-Data Science)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define time complexity and space complexity in the context of algorithm analysis.	1M	1	1
	ii.	Identify the primary difference between AVL trees and B-trees.	1M	1	1
	iii.	Represent the time complexity of Merge Sort.	1M	2	1
	iv.	Distinguish between the Greedy method and Divide and Conquer.	1M	2	1
	v.	State the differences between Dynamic Programming and Divide and Conquer.	1M	3	1
	vi	How are negative edge costs handled in finding single source shortest path?	1M	3	1
	vii.	State and justify the number of colors required to color a complete graph with 4 vertices.	1M	4	1
	viii	Define the term "branch and bound" in algorithm design.	1M	4	1
	ix.	What is the difference between NP-Hard and NP-Complete problems?	1M	5	1
	x.	Scheduling Identical Processors problem is NP-hard. Why?	1M	5	1
Q.2(A)		Insert the values [50, 30, 20, 10, 40, 60, 70, 80, 65, 75] into an initially empty AVL tree. After each insertion, show the tree structure and explain any rotations that occur to maintain balance. Show the tree structure after deletion of values [20, 40, 60] and explain any rotations that occur to maintain balance.	12M	1	4
		OR			
Q.2(B)		Characterize big-theta, big-omega and big-oh notations with graphical representation. Give suitable example for each.	12M	1	3
Q.3(A)		Solve the fractional knapsack problem using the Greedy method for the following data: Number of items (n): 5 Profits (p): 24,15,10,20,12 Weights (w): 6, 4, 3, 5, 2 Maximum sack capacity (M): 10 Compute the optimal solution, including the total profit and the fractions of items included in the knapsack.	12M	2	4
		OR			
Q.3(B)		Given the array of numbers [38, 27, 43, 3, 9, 82, 10, 75], apply merge sort step-by-step to find the sorted list. Analyze its time complexity.	12M	2	1
Q.4(A)		Consider the following directed graph with weighted edges: Vertices: A, B, C, D, E Edges: A → B (weight: 6) A → C (weight: 5) A → D (weight: 5) B → E (weight: -1) B → D (weight: -2) C → B (weight: -2) D → E (weight: 1) E → C (weight: 1)	12M	3	4

Using the Bellman-Ford algorithm, Find the shortest path from vertex A to all other vertices. Show all the iterations and update the distance table accordingly. Check if the graph contains any negative weight cycle and justify your answer.

OR

Q.4(B) A travel agency offers a package that includes 5 major tourist destinations in a country. Tourists start and end their journey at the airport. The goal is to minimize travel time between destinations while ensuring they visit each destination exactly once. Design an optimal tour using Dynamic Programming to minimize total travel time. Also, Justify how is the tour optimal? 12M 3 2

Use the travel time matrix:

From/To	Airport	Beach	Museum	Mountain	City Center
Airport	0	3	6	8	5
Beach	3	0	7	4	6
Museum	6	7	0	5	2
Mountain	8	4	5	0	3
City Center	5	6	2	3	0

Q.5(A) Solve the 8-Queens Problem for a 8×8 chessboard. Show the state space tree and explain the process of backtracking to find the first solution. 12M 4 3

OR

Q.5(B) Consider the following distance matrix for a Traveling Salesman Problem (TSP) with 4 cities (A, B, C, D): 12M 4 4

	A	B	C	D
A	0	10	15	20
B	10	0	35	25
C	15	35	0	30
D	20	25	30	0

Apply the Branch and Bound algorithm to find the minimum cost for a tour that visits each city exactly once and returns to the starting city. Show the lower bounds and the decisions made at each branch of the search tree, illustrating how the algorithm prunes branches that do not lead to an optimal solution.

Q.6(A) Interpret the Job Shop Scheduling problem and its significance in production and operations management. Justify why this is categorized as NP-hard. 12M 5 3

OR

Q.6(B) Explain the concept of the Scheduling Identical Processors problem. Discuss the goals and constraints and justify why this is categorized as NP-hard. 12M 5 4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSD104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

JAVA PROGRAMMING

(CSE-Data Science)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Examine how command line arguments can be used in Java by designing a simple program to display a student's name and roll number.	1M	1	2
	ii.	Is Java Platform independent? Justify your answer.	1M	1	2
	iii.	Give the usage of 'this' and 'super' keyword.	1	2	2
	iv.	Demonstrate the difference between constructors and methods with examples.	1	2	1
	v.	Is Java support all types of Inheritance? Justify your answer.	1	3	2
	Vi	Compare and contrast final class and abstract class	1	3	2
	vii.	Give the difference between throw and throws keywords.	1	4	2
	viii	Illustrate the process of creating and handling user-defined exceptions in Java	1	4	2
	ix.	Which package contains String Class in Java?	1	5	1
	x.	Draw Life cycle of thread.	1	5	2
Q.2(A)		Demonstrate the use of data types, type casting, and control statements in a single Java program that: • Takes three numbers as input, • Finds the largest number, • Displays whether it is even or odd using conditional and looping constructs	12	1	5
		OR			
Q.2(B)		Explain arrays in Java with examples. Write a Java program to store marks of 5 students in a two-dimensional array and calculate the average marks for each student.	12	1	4
Q.3(A)		Create a Java program that demonstrates method overloading by the following specifications: define a class Shape with multiple area() methods to calculate the area of a circle (given radius), a rectangle (given length and width), and a triangle (given base and height).	12	2	5
		OR			
Q.3(B)		Explain the concept of classes and objects in Java. Describe class declaration, class members, access modifiers, and object creation with suitable examples.	12	2	5
Q.4(A)		Write a detailed note on abstract classes and the final keyword. Explain final variable, final method, and final class with examples.	12	3	4
		OR			
Q.4(B)		Demonstrate the implementation of interface in Java with the following: Define an interface Drivable that declares a method drive(). Then, create two classes Car and Motorcycle that implement Drivable, each providing its own version of drive() and also store the number of wheels in a constructor. Finally, write a main method to create one	12	3	5

	Car and one Motorcycle, call their drive() methods and print the number of wheels for each.			
Q.5(A)	Write a program using Character Streams to count: total characters total words total lines from a text file. Explain concepts of FileReader, BufferedReader, and handling	12	4	4
	OR			
Q.5(B)	Discuss the significance of try and catch block, throws keyword and throw keyword in exception handling by the help of a program(s). Write a Java program to handle a user defined unchecked exception and use a finally block to display a completion message.	12	4	4
Q.6(A)	Write a Java program that accepts a string from the user and performs the following: • Counts the number of vowels, consonants, digits, and spaces. • Converts the entire string to uppercase. • Reverses the string using StringBuilder.	12	5	4
	OR			
Q.6(B)	Write a Java program that prints the numbers from 1 to 10, each on a new line, pausing for 5 seconds between each number. Show the use the Thread.sleep() method.	12	5	5

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSC101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December- 2025

ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

(CSE-Cyber Security)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define time complexity.	1M	1	1
	ii.	What is asymptotic notation?	1M	1	1
	iii.	What is a greedy algorithm?	1M	2	1
	iv.	Define job sequencing with deadlines.	1M	2	1
	v.	Define TSP.	1M	3	1
	vi	State a limitation of dynamic programming.	1M	3	1
	vii.	What is graph coloring?	1M	4	1
	viii	What is backtracking?	1M	4	1
	ix.	What is meant by NP in computational complexity?	1M	5	1
	x.	Give an example of NP-hard graph problem.	1M	5	1
Q.2(A)		Describe insertion and deletion operations in an AVL tree with suitable examples.	12M	1	3
		OR			
Q.2(B)		Compare AVL trees and B-trees in terms of structure, usage, and performance.	12M	1	4
Q.3(A)		Solve the 0/1 knapsack using the greedy method.	12M	2	3
		OR			
Q.3(B)		Discuss Merge Sort and derive its time complexity.	12M	2	3
Q.4(A)		Construct an optimal binary search tree with an example.	12M	3	4
		OR			
Q.4(B)		Apply dynamic programming to solve the Travelling Salesperson Problem	12M	3	3
Q.5(A)		Discuss the graph coloring problem with example.	12M	4	3
		OR			
Q.5(B)		Solve the 8-Queens problem using backtracking.	12M	4	4
Q.6(A)		Explain NP, NP-Complete and NP-Hard classes with examples.	12M	5	3
		OR			
Q.6(B)		Explain the Chromatic Number Decision Problem.	12M	5	3

*** **END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSC102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

DATABASE MANAGEMENT SYSTEMS

(CSE-Cyber Security)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	In an ER diagram, what does a double rectangle represent?	1M	1	1
	ii.	What is data redundancy?	1M	1	1
	iii.	What does TCL stand for in SQL?	1M	2	1
	iv.	Differentiate count(column_name) and count(*).	1M	2	2
	v.	Define functional dependency.	1M	3	1
	vi	Which normal form removes partial dependency?	1M	3	2
	vii.	What is database recovery?	1M	4	1
	viii	What is a dirty read problem in transaction processing?	1M	4	2
	ix.	Give one advantage of using NoSQL databases.	1M	5	1
	x.	Give an example of a document-oriented NoSQL database.	1M	5	1
Q.2(A)		Discuss the different types of database users and explain the roles and responsibilities of DBA.	12M	1	2
		OR			
Q.2(B)		Draw an ER diagram for a Hospital Management System including entities, attributes, and relationships and explain in detail.	12M	1	4
Q.3(A)		Demonstrate the use of DDL, DML, and TCL commands with syntax and examples for creating and manipulating database tables.	12M	2	3
		OR			
Q.3(B)		Write SQL queries using set operations and aggregate functions to retrieve summarized results from an employee database.	12M	2	4
Q.4(A)		Discuss 3NF and 4NF with suitable examples and explain multivalued dependency.	12M	3	4
		OR			
Q.4(B)		Differentiate between lossless decomposition and lossy decomposition. Explain with examples how decomposition can be both lossless and dependency preserving.	12M	3	4
Q.5(A)		What is serializability? Describe the difference between conflict seri and view serializability with examples.	12M	4	4
		OR			
Q.5(B)		Describe the Two-Phase Locking (2PL) protocol. How does it ensure serializability? Discuss its advantages and drawbacks such as deadlock.	12M	4	4
Q.6(A)		Write and explain a PL/SQL function to calculate and return the total salary of an employee after applying a bonus percentage.	12M	5	3
		OR			
Q.6(B)		Explain the need for NoSQL databases. Compare SQL and NoSQL in terms of scalability, flexibility, and consistency.	12M	5	4

*** END***

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSM101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

PYTHON PROGRAMMING

(CSE-AI&ML)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define program.	1M	1	1
	ii.	Write the function name that is used to find the type of a variable.	1M	1	1
	iii.	Define operator.	1M	2	1
	iv.	Write the syntax for nested if – else.	1M	2	1
	v.	Define List with syntax.	1M	3	1
	vi	Differentiate Tuple with Set.	1M	3	1
	vii.	How to create a String in python?	1M	4	2
	viii	Define Directory	1M	4	1
	ix.	List out the modes of a file.	1M	5	1
	x.	Define package.	1M	5	1
Q.2(A)		Discuss about the different data types present in python with example programs.	12M	1	3
		OR			
Q.2(B)		Discuss in detail about building blocks of algorithms (flowchart).	12M	1	3
Q.3(A)		Briefly Explain about Control Statements in Python with example programs.	12M	2	2
		OR			
Q.3(B)		If the age of Ram, Sam and Khan are input through the keyboard, write a python program and algorithm using nested if-else to determine the eldest and youngest of the three.	12M	2	3
Q.4(A)		Briefly explain about function declaration and calling function with example programs.	12M	3	2
		OR			
Q.4(B)		Explain the built-in functions of Set with an example script for each function.	12M	3	2
Q.5(A)		Briefly discuss about range function related to string in python with examples.	12M	4	3
		OR			
Q.5(B)		Write a python program to demonstrate the usage of common python string methods.	12M	4	3
Q.6(A)		Discuss the following methods associated with the file object a) read() b) readline() c) readlines() d) tell() e) seek() f) write()	12M	5	3
		OR			
Q.6(B)		What is an Exception? Explain about exception handling with an example program.	12M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSM102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R23) Regular & Supplementary End Semester Examinations, December– 2025

DATABASE MANAGEMENT SYSTEMS

(CSE - AI & ML)

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define data redundancy.	1M	1	1
	ii.	Give an example of a client–server DBMS.	1M	1	1
	iii.	What is a foreign key?	1M	2	1
	iv.	Define Equi-join.	1M	2	1
	v.	What is relational algebra?	1M	3	1
	vi	Name any two basic relational algebra operations.	1M	3	1
	vii.	What is a hash function?	1M	4	1
	viii	Define Two-Phase Locking (2PL).	1M	4	1
	ix.	Define access control.	1M	5	1
	x.	What is a user credential in authentication?	1M	5	1
Q.2(A)		Explain in detail about the differences between the file system and database system with their advantages and disadvantages.	12M	1	2
		OR			
Q.2(B)		Design a database schema for an online shopping system, identify different entities, and specify relationships using the ER model.	12M	1	3
Q.3(A)		Explain how to create and manipulate database tables using simple SQL queries using SELECT, INSERT, UPDATE, and DELETE with suitable example.	12M	2	2
		OR			
Q.3(B)		Explain the various types of joins supported by SQL.	12M	2	2
Q.4(A)		Explain the process of translating SQL queries into relational algebra expressions	12M	3	2
		OR			
Q.4(B)		Construct a relational schema that violates join dependency and apply decomposition to achieve Fifth Normal Form (5NF).	12M	3	3
Q.5(A)		Describe the ACID properties of a transaction in detail. Why are these properties essential for reliable transaction processing?	12M	4	3
		OR			
Q.5(B)		Demonstrate how buffer management optimizes disk I/O operations during transaction processing in a DBMS.	12M	4	3
Q.6(A)		Describe the Discretionary Access Control (DAC) model. How is DAC implemented in SQL databases?	12M	5	3
		OR			
Q.6(B)		Explain with an example how a SQL injection attack is carried out and apply preventive measures.	12M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CSN101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R23) Supplementary End Semester Examinations, December- 2025

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

CSE - Networks

Time: 3Hrs **Max Marks: 70**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define object-oriented programming.	1M	1	1
	ii.	What are control statements in Java?	1M	1	2
	iii.	Explain the significance of the this keyword.	1M	2	2
	iv.	What is a constructor? Give an example.	1M	2	1
	v.	Differentiate between an abstract class and an interface.	1M	3	2
	vi	Define method overriding with an example.	1M	3	1
	vii.	What is a package in Java?	1M	4	1
	viii.	Explain the purpose of the finally block in exception handling.	1M	4	1
	ix.	What is the role of the StringBuffer class?	1M	5	1
	x.	Define thread states in Java.	1M	5	1
Q.2(A)		Write a program to demonstrate the use of looping statements in Java.	12M	1	3
		OR			
Q.2(B)		Explain the structure of a Java program with an example.	12M	1	2
Q.3(A)		Write a program to demonstrate constructor overloading in Java.	12M	2	3
		OR			
Q.3(B)		Discuss access modifiers and their role in Java classes with examples.	12M	2	2
Q.4(A)		Explain the concept of inheritance and demonstrate its types with examples.	12M	3	2
		OR			
Q.4(B)		Write a program to implement an interface and demonstrate its features.	12M	3	3
Q.5(A)		Write a program to demonstrate user-defined exceptions.	12M	4	3
		OR			
Q.5(B)		Discuss the differences between byte streams and character streams in Java.	12M	4	3
Q.6(A)		Write a program to compare two strings and modify them using StringBuffer.	12M	5	3
		OR			
Q.6(B)		Explain thread synchronization and demonstrate it with an example.	12M	5	2

***** END*****