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

Question Paper Code: 23HUM102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

ECONOMICS AND FINANCIAL ACCOUNTING FOR ENGINEERS

(Common to CE, EEE, ME, ECE, and CSE)

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)	How would you classify the Economics?	1	1	1
	ii)	Demonstrate law of supply	1	1	1
	iii)	Write production equation.	1	2	1
	iv)	What is profit volume ratio?	1	2	1
	v)	Discuss Iso quant	1	3	2
	vi)	Define monopoly.	1	3	2
	vii)	What is Book –Keeping?	1	4	1
	viii)	Construct proforma of Ledger	1	4	2
	ix)	Write any two solvency ratios.	1	5	1
	x)	What is profitability index?	1	5	1
2(A)		What is law of demand? Explain factors and assumptions of it.	12	1	2
		OR			
2(B)		How do you identify the responsiveness quantity of demand and price? How do you classify the price elasticity of demand?	12	1	3
3(A)		What is production function? Examine production function with two variables.	12	2	2
		OR			
3(B)		Profit Rs 40000 Contribution Rs 60000 Sales Rs. 600000 Evaluate 1) P/V Ratio 2) Margin of safety and 3) BEP	12	2	4
4(A)		What is pricing? Explain objectives of pricing.	12	3	2
		OR			
4(B)		Elucidate features and price out- put determination under perfect competition.	12	3	2
5(A)		Prepare trial balance from the following. Building Rs. 5000 Purchases Rs. 4000 Rent paid Rs. 1000 Machinery Rs. 3000 Capital Rs. 8000 Cash Rs. 2000 Sales Rs. 4000 Rent received Rs. 3000	12	4	4
		OR			

5(B)	Build the trading a/c and profit & loss a/c proforma.	12	4	3
6(A)	The following are the financial statements of Balaji & Co for the year 31-12-2015	12	5	4

Balance Sheet as on 31-12-2015

Equity Share Capital	100000	Fixed assets	150000
General reserve	90000	Stock	42500
Profit & Loss a/c	7500	Debtors	19000
Creditors	35000	Cash	61000
6% debentures	30000	Proposed Dividends	10000
	272500		272500

Trading and Profit & Loss A/C for the year ended 31-12-2015

To Cost of goods sold	180000	By Sales	300000
To Gross Profit C/D	120000		
	300000		300000
To expenses	100000	By Gross Profit b/d	120000
To Net profit	20000		
	120000		120000

You are required to illustrate the following:

1.Current ratio
2.Acid Test ratio
3.Gross Profit ratio
4. Net Profit Ratio
5. Debtors Turnover Ratio

OR

6(B)	How do you classify different types of capital budgeting techniques	12	5	2

*****END*****

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

Question Paper Code: 23CE105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

ENGINEERING HYDROLOGY

(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

S.No.		Question	Marks	CO	BL
1.	i)	Differentiate between evaporation and transpiration	1	1	1
	ii)	What are the first checks to be carried out after collecting rainfall data?	1	1	1
	iii)	What is the main advantage of double ring infiltrometer with respect to single ring	1	2	1
	iv)	What do you understand by the term "initial abstraction from rainfall"?	1	2	1
	v)	What is basin lag?	1	3	1
	vi)	What is the main advantage of bubble gauge in measuring stream flow?	1	3	1
	vii)	What is time of concentration?	1	4	1
	viii)	What is attenuation in flood routing?	1	4	1
	ix)	What is Dupit's Parabola?	1	5	1
	x)	What is Aquiclude?	1	5	1
2(A)	(i)	Discuss about different types of precipitation.	6	1	2
	(ii)	Explain the method to check consistency of rainfall data?	6	1	2
		OR			
2(B)		With suitable example discuss various methods of rainfall measurement	12	1	2
3(A)	(i)	The infiltration capacity in a basin is represented by Horton's equation as $f_p = 3.0 + e^{-3t}$ where fp is in cm/h and t is in hours. Assuming the infiltration to take place at capacity rates in a storm of 60 minutes duration, estimate the depth of infiltration in (i) the first 30 minutes and (ii) the second 30 minutes of the storm.	6	2	4
	(ii)	Signify the process of infiltration	6	2	2
		OR			
3(B)		A storm with 10 cm rainfall resulted in 5.6 cm of runoff. The duration of rainfall was 16hrs and its time distribution is given below. Find the ø-index of the storm.	12	2	4
4(A)	(i)	What is rating curve? Outline various problems associated with rating curve?	6	3	2
	(ii)	Explain the method of finding stage at zero discharge	6	3	2
		OR			
4(B)		Given the ordinates of a 4-h unit hydrograph as below derive the ordi nates of a 8-h unit hydrograph for the same catchment.	12	3	4

Time (h)	0	2	4	6	8	10	12	14	16
Cumulative rainfall (cm)	0	0.6	1.3	2.7	5.1	6.9	8.6	9.2	10

Time (h)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate of 4-h UH	0	20	80	130	150	130	90	52	27	15	5	0

5(A) Route the following flood hydrograph through a river reach for which K=10.0 h and x=0.20. At the start of the inflow flood, the outflow discharge is $10 m^3/s$ — 12 — 4 — 4

Time(h)	0	6	12	18	24	30	36	42	48	52
Inflow (m^3/s)	9	17	47	62	57	40	39	29	16	11

OR

5(B) A 180-ha watershed has the following characteristics: Maximum length of travel of water in the catchment=3500m, Difference in elevation between the most remote point on the catchment and the outlet=92m, Land use: — 12 — 4 — 4

Land use/land cover	Area (ha)	Runoff coefficient
Forest	110	0.19
Pasture	30	0.18
Cultivated Land	40	0.41

The maximum intensity-duration-frequency relationship for the watershed is given by

$$i = \frac{3.02T^{0.128}}{(D + 0.17)^{0.715}}$$

Where, i= intensity in cm/h, T=Return period in years and D=duration of rainfall in hours. Estimate 50 year peak runoff from the watershed that can be expected.

6(A) (i) Draw and describe different zones of ground water. — 6 — 5 — 2

(ii) During the recuperation test of a 5.0 m open well a recuperation of the depression head from 2.5 m to 1.25 m was found to take place in 90 minutes. Determine the (i) specific capacity per unit well area and (ii) yield of the well for a safe drawdown of 2.5 m — 6 — 5 — 4

OR

6(B) (i) Using suitable diagram derive the expression to estimate discharge from confined aquifer of width B — 6 — 5 — 3

(ii) A 30cm diameter well completely penetrates a confined aquifer of permeability 50 m/day. The length of the stainer is 20m. Under steady state of pumping, the drawdown at the well was found to be 3m and the radius of influence was 350m. calculate the discharge. — 6 — 5 — 4

END

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

Question Paper Code: 23 CE107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

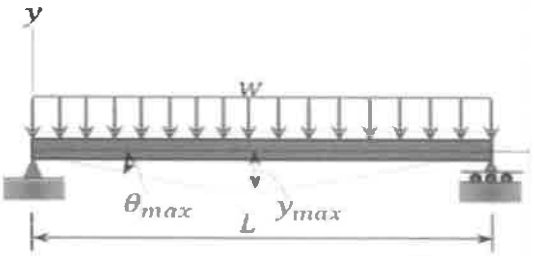
STRUCTURAL ANALYSIS

(Civil Engineering)

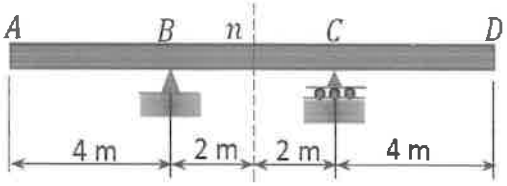
Time: 3Hrs **Max Marks: 70**

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

S.No.		Question	Marks	CO	BL
1.	i)	State Castigliano's first theorem.	1	1	3
	ii)	What is the work done by external applied load	1	1	1
	iii)	Define the degree of static indeterminacy for a plane frame.	1	2	3
	iv)	How is the degree of static indeterminacy calculated for a pin-jointed plane truss.	1	2	2
	v)	What are the advantages of using fixed beams in construction.	1	3	1
	vi)	Write the expression for the three-moment equation.	1	3	3
	vii)	For a fixed-fixed beam subjected to a uniformly distributed load, what are the rotations at both ends according to the slope deflection method? (a) Equal and non-zero (b) Unequal and non-zero (c) Zero (d) Dependent on the span length	1	4	2
	viii)	In the slope deflection equations, the terms involving the rotation at the near end are multiplied by: (a) 2EI/L (b) 4EI/L (c) 6EI/L (d) 3EI/L	1	4	3
	ix)	What is meant by "non-sway" in the context of frame analysis?	1	5	2
	x)	What is the sum of the distribution factor at the joint?	1	5	1
2(A)		Derive the expression for the strain energy stored in a member subjected to shear forces.	12	1	4
		OR			
2(B)		For Simply supported beam shown in Figure, find slopes and deflections using energy method.	12	1	5

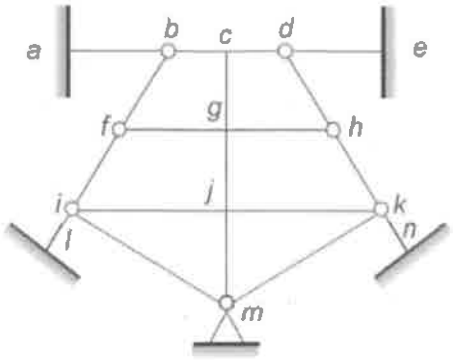


3(A)		For the double overhanging beam shown in Figure, construct the influence lines for the support reactions at B and C and the shearing force and the bending moment at section n.	12	2	5

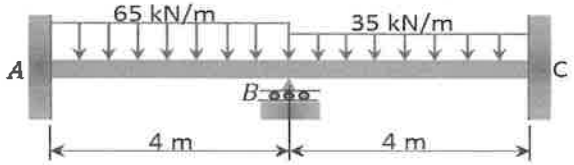


OR

3(B)		What is kinematic indeterminacy? Explain the kinematic indeterminacy for beam, truss and frame. Calculate kinematic indeterminacy for the frame shown in the Figure. Consider the axial deformation.	12	2	5

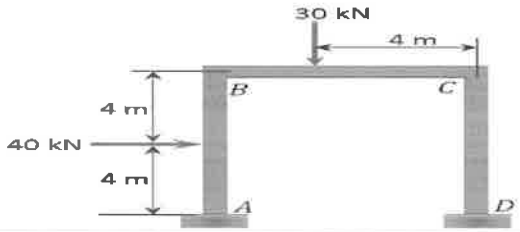


4(A)	Find the fixed end moment for the fixed beam subjected to uniformly distributed load throughout the span.	6	3	4
	OR			
4(B)	Find the fixed end moment for the fixed beam subjected to point load at the mid span.	12	3	4
5(A)	Using the slope-deflection method, determine the end moments and the reactions at the supports of the beam shown in Figure and draw the shearing force and the bending moment diagrams. EI = constant.	12	4	5

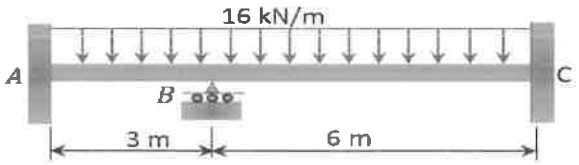


OR

5(B)	Using the slope-deflection method, determine the end moments of the frame shown in Figure and draw the shearing force and the bending moment diagrams. EI = constant.	12	4	5

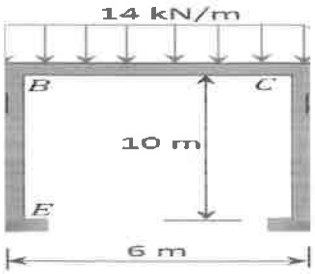


6(A)	Use the moment distribution method to compute the end moment of members of the beams shown in Figure 8 and draw the bending moment and shear force diagrams. EI = constant	12	5	5



OR

6(B)	Use the Kani's method to compute the end moment of members of the frame shown in Figure and draw the bending moment. EI = constant	12	5	5



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all Ticket No: | | | | | | | | | | |

Question Paper Code: 23CE106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

CONCRETE TECHNOLOGY

(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

S.No.		Question	Marks	CO	BL
1.	i)	What is the initial setting time of OPC?	1	1	1
	ii)	What is hydration of cement?	1	1	1
	iii)	What is the purpose of vibration in concrete?	1	2	1
	iv)	List any one factor that causes bleeding.	1	2	1
	v)	Define compressive strength.	1	3	1
	vi)	What is drying shrinkage?	1	3	1
	vii)	Which IS code used for mixed design.	1	4	1
	viii)	What is meant by statistical quality control in mix design?	1	4	1
	ix)	What is fiber reinforcement concrete made of?	1	5	1
	x)	What is polymer concrete made of?	1	5	1
2(A)		Explain the different types of cement and their applications.	12	1	2
		OR			
2(B)		Explain the Classification of aggregates based on shape and texture. Discuss the thermal properties of aggregates.	12	1	2
3(A)		Demonstrate the process of curing and its significance on concrete strength.	12	2	3
		OR			
3(B)		Discuss factors affecting the workability of fresh concrete.	12	2	2
4(A)		Illustrate the relationship between compressive and tensile strength.	12	3	3
		OR			
4(B)		Compare various NDT methods for hardened concrete.	12	3	4
5(A)		Explain the different method of concrete mixed design	12	4	2
		OR			
5(B)		Design a concrete mix using IS method for M20 grade.	12	4	4
6(A)		Brief the production of Fiber reinforced concrete and enlist the salient parameters affecting the compressive strength of Fiber reinforced concrete.	12	5	3
		OR			
6(B)		Evaluate the advantages of polymer concrete, Fiber reinforced concrete and high-performance concrete over conventional concrete.	12	5	4

END

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

Question Paper Code: 23CE108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

ENVIRONMENTAL ENGINEERING

(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

S.No.		Question	Marks	CO	BL
1.	i)	What is the per capita water demand as per IS standards?	1	1	1
	ii)	What is the Acceptable range of turbidity value for drinking water as per IS standards?	1	1	1
	iii)	What is the purpose of grit chambers?	1	2	1
	iv)	Describe the impact of improper sewage disposal on the environment?	1	2	2
	v)	What is the purpose of sludge dewatering?	1	3	1
	vi)	What is the main constituent of biogas?	1	3	1
	vii)	What is the full form of AQI?	1	4	1
	viii)	Name any two equipment's used for particulate control	1	4	1
	ix)	Define Municipal solid waste.	1	5	1
	x)	Define sanitary landfill.	1	5	1
2(A)		Explain in detail about various treatment units in water treatment plant with neat sketch.	12	1	3
		OR			
2(B)		The population of 5 decades from 1960 to 2000 are given in table. Find out the population after 2020,2030 and 2040 decades, by using Arithmetic Increase method	12	1	4

Year	1960	1970	1980	1990	2000
Population	25,000	36,000	42,000	48,000	56,000

3(A)		Explain the working procedure of Activated Sludge Process (ASP)	12	2	2
		OR			
3(B)		Write a note on sewer appurtenances and their functions.	12	2	2
4(A)		Explain in detail about working principle of Imhoff Tank with neat sketch?	12	3	3
		OR			
4(B)		Explain in detail about working principle and design considerations of Septic Tank with neat sketch?	12	3	3
5(A)	(i)	List out the different types of Air pollutants and Explain their Impact on Environment?	6	4	3
	(ii)	What is Acid Rains? Explain in detail about the Causes of it?	6	4	3
		OR			
5(B)		Explain about working process of any two control devices of Air pollution?	12	4	3
6(A)	(i)	Explain in detail about the Solid Waste Management System?	6	5	3
	(ii)	Explain the effects of Solid waste on Environment	6	5	3
		OR			
6(B)		What is biodegradable solid waste? Explain the methods of waste management using reduce, reuse and recycle principles?	12	5	3

*****END*****

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

Question Paper Code: 23EEE106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

ANALOG CIRCUITS

(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

S.No.		Question	Marks	CO	BL
1.	i)	What are the different bias compensation techniques?	1	1	1
	ii)	Draw the shunt positive clipper circuit and its transfer characteristics?	1	1	1
	iii)	What is the difference between positive and negative feedback?	1	2	1
	iv)	Define the transistor H-parameters?	1	2	1
	v)	Write the expression for the frequency of oscillation in RC phase shift oscillator?	1	3	1
	vi)	Find the maximum frequency for a sine wave output voltage of 12v peak with an OP-AMP whose slew rate is 0.5V/ μs?	1	3	2
	vii)	Draw the op-amp circuit that works as adder?	1	4	1
	viii)	What are the features of an instrumentation amplifier?	1	4	1
	ix)	Draw the pin diagram of 555 timer?	1	5	1
	x)	Which type of ADC is the fastest and why?	1	5	1
2(A)	(i)	Derive the expressions for stability factor and coordinates of operating point for a collector to base feedback bias?	6	1	3
	(ii)	Determine the quiescent current and collector to emitter voltage for a germanium transistor with β = 50 in a self-biasing arrangement. Draw the circuit with a given component value with VCC = 20 V, RC = 2 k Ω, RE = 100 Ω, R1 = 100 kΩ and R2 = 5 kΩ . Also find the stability factor.	6	1	3
		OR			
2(B)		Explain the working of series positive and negative biased clippers with their output waveforms and transfer characteristics?	12	1	2
3(A)	(i)	Describe the general characteristics of negative feedback amplifiers?	6	2	2
	(ii)	Draw the equivalent circuit of the voltage series feedback amplifier and derive the expressions for input and output resistances?	6	2	4
		OR			
3(B)		Draw the equivalent circuit of the simplified CE & CC hybrid model and derive the equations for current gain, voltage gain, and input impedance?	12	2	4
4(A)	(i)	Draw and explain the block diagram of an Op-amp. Discuss the functions of each stage in detail.	6	3	2
	(ii)	With a neat diagram, explain the working of crystal oscillator?	6	3	2
		OR			
4(B)		With a neat diagram, explain the working of the Wien bridge oscillator and derive the expression for the frequency of oscillation?	12	3	4

5(A)	(i)	Design a triangular wave generator and derive the expression for the frequency of oscillation?	6	4	4
	(ii)	Draw the circuit diagram of ideal and practical integrator and obtain the expression for their output Voltage.	6	4	3
		OR			
5(B)		With a neat circuit diagram, explain the working principle of the instrumentation amplifier and derive its differential gain?	12	4	2
6(A)	(i)	With a neat block diagram, Explain the working of successive approximation type ADC?	6	5	4
	(ii)	Discuss the operation of IC 555 as an astable multi vibrator?	6	5	2
		OR			
6(B)	(i)	Draw the block diagram of Phase Locked Loop (PLL) and explain its working?	6	5	2
	(ii)	Discuss the specifications of the ADC/DAC?	6	5	2

*****END*****

'all Ticket No: | | | | | | | | | | |

Question Paper Code: 23EEE109

..ADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

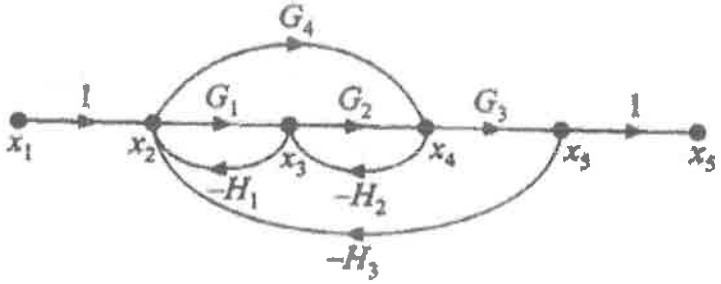
B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

CONTROL SYSTEMS

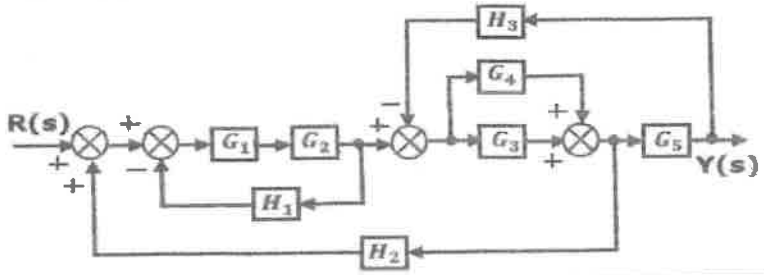
(Electrical & Electronics Engineering)

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

S.No.		Question	Marks	CO	BL
1.	i)	Clarify an automatic toaster as an example of which type of control system.	1	1	1
	ii)	Determine the closed-loop transfer function for a system with a given open-loop transfer function under positive feedback. $$G(s) = \frac{s+10}{s^2+2s+110}$$	1	1	2
	iii)	Explain the meaning of the order of a system in control systems.	1	2	1
	iv)	Given a damping ratio of 0.6 and a natural frequency of oscillation of 8 rad/sec, calculate the rise time of the system.	1	2	2
	v)	Define the term corner frequency as used in frequency response analysis.	1	3	1
	vi)	Given the transfer function $\frac{S+2}{S^2(S+4)(S^2+4S+6)}$. Determine the number of poles at the origin	1	3	2
	vii)	Define phase margin and gain margin in control system stability analysis.	1	4	1
	viii)	Explain the relationship between system stability and the coefficients of the characteristic polynomial.	1	4	1
	ix)	Define controllability and observability of SISO.	1	5	1
	x)	List any two advantages of state space analysis.	1	5	2
2(A)		Obtain the closed loop transfer function for the system shown in below figure: 	12	1	3

OR

2(B)		Evaluate the closed-loop transfer function using the block diagram reduction technique and verify the results using Signal Flow Graph approach 	12	1	4

3(A)	(i)	The open loop transfer function of a unity feedback control system is given by $G(s) = \frac{25}{s(s+5)}$. Calculate the natural frequency of oscillations, damped frequency of oscillations, damping ratio, maximum overshoot and settling time for a unit step input, also calculate steady state error for a unit Ramp input.	6	2	3
	(ii)	Explain the effect of proportional integral system in assessing the steady state errors of a system.	6	2	2
		OR			
3(B)		The unity negative feedback system is characterized by an open loop transfer function G(s) = K/s(s+1). Determine the gain K so that the system will have a damping ratio of 0.5 for this value of K. Determine time domain specifications.	12	2	4
4(A)		Draw the root locus plot for a unity feedback system having forward path transfer function $G(s) = \frac{1}{s(s+1)(1+2s)}$. Determine the value of Gain margine and phase margine.	12	3	3
		OR			
4(B)		The characteristic equation for the feedback control system is given as; $s^6 + s^5 + 6s^4 + 5s^3 + 10s^2 + 5s + 5 = 0$. Determine the range of values of K, for which the system is stable.	12	3	4
5(A)		Draw the polar plot for the system whose open loop transfer function is $G(s) = \frac{(1+0.2S)(1+0.25S)}{S^3+(1+0.005S)(1+0.001S)}$ and analysis the Stability of the system.	12	4	3
		OR			
5(B)		Consider the transfer function of a control system: $G(s) = \frac{10}{S(1+0.4S)(1+0.1S)}$. Plot the bode plot and determine gain cross over frequency, phase cross over frequency, Gain margin and phase margin.	12	4	3
6(A)	(i)	Find the state transition matrix φ(t) for the system whose system matrix $A = \begin{pmatrix} 0 & 1 \\ -1 & -2 \end{pmatrix}$	6	5	3
	(ii)	Write the properties of state transient matrix $\varphi(t)$.	6	5	2
		OR			
6(B)		A linear time invariant system is described by the following state model. Obtain its transfer function of the system. $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -9 & -11 & -9 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 100 \end{bmatrix} u$ and $y = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$	12	5	3

END

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

Question Paper Code: 23EEE107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

POWER SYSTEM - I

(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

S.No.		Question	Marks	CO	BL
1.	i)	Define about smart grid	1	1	1
	ii)	Define maximum demand.	1	1	1
	iii)	Define about short transmission line.	1	2	1
	iv)	Define the transposition	1	2	1
	v)	Name any four major equipment used in a 33/11 kV substation	1	3	1
	vi)	What is the function of a potential transformer (PT) in a substation?	1	3	1
	vii)	Name three types of underground cables used in power systems.	1	4	1
	viii)	Write the expression for the capacitance of a single-core cable.	1	4	1
	ix)	Define fixed cost in the context of power generation	1	5	1
	x)	What does an integrated load duration curve represent?	1	5	1
2(A)	(i)	Draw the schematic diagram of a thermal power station and explain its operation in detail. Also, discuss the advantages and disadvantages of thermal power plants.	6	1	2
	(ii)	Draw a neat schematic diagram of a PV System and explain the functions of various components.	6	1	2
		OR			
2(B)		Draw the schematic diagram of a nuclear power station and discuss its operation, explain each component in detail.	12	1	
3(A)	(i)	Derive an expression for the loop inductance of a single-phase line.	6	2	3
	(ii)	What do you understand by the constants of an overhead transmission line?	6	2	2
		OR			
3(B)		Using rigorous method, derive expressions for sending end voltage and current for a long transmission line.	12	2	3
4(A)	(i)	What is a Gas Insulated Substation (GIS)? Explain its constructional features and working principle.	6	3	2
	(ii)	Give the comparison of outdoor and indoor sub-stations.	6	3	2
		OR			
4(B)		Draw and explain the single line diagram of a 33/11 kV substation. Identify and describe the function and location of each major equipment used in the layout.	12	3	2
5(A)	(i)	With a neat diagram, explain the complete a.c. system for distribution of electrical energy.	6	4	2
	(ii)	Explain the various methods used for laying underground cables. Compare the advantages and disadvantages of each method in detail.	6	4	2
		OR			
5(B)		Derive the formula capacitance in single core and 3 core cable with neat diagram?	12	4	3
			6	5	2

6(A)	(i)	Define and differentiate between Load Factor, Diversity Factor, Plant Capacity Factor, and Plant Use Factor. Explain how each of these parameters influences the economic operation of a power plant.			
	(ii)	Explain in detail the following types of electricity tariff methods with examples: (i) Simple Tariff, (ii) Flat Rate Tariff, (iii) Block Rate Tariff. Mention their advantages and disadvantages.	6	5	2
		OR			
6(B)		A generating station has a maximum demand of 30 MW, a load factor of 70%, a plant capacity factor of 60%, and a plant use factor of 62%. Find (a) the daily energy produced, (b) the reserve capacity of the plant, (c) the maximum energy that could be produced daily if the plant, while running as per schedule, were fully loaded.	12	5	3

*****END*****

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

Question Paper Code: 23EEE108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

INDUCTION AND SYNCHRONOUS MACHINES

(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

S.No.		Question	Marks	CO	BL
1.	i)	Can induction motor rotate at synchronous speed? Why?	1	1	2
	ii)	Define crawling?	1	1	1
	iii)	Write the torque equation of three phase induction motor.	1	2	1
	iv)	How to conduct blocked rotor test on induction motor?	1	2	1
	v)	State the limitation of shaded pole single phase induction motor.	1	3	1
	vi)	Draw the torque slip characteristics of single-phase induction motor.	1	3	1
	vii)	Write down the emf equation of alternator.	1	4	1
	viii)	What is the use of Potier triangle?	1	4	1
	ix)	Define synchronous Condenser?	1	5	1
	x)	Specify the role of damper winding in synchronous motor.	1	5	2
2(A)		Explain constructional detail and working principle of 3 phase induction motor?	12	1	3
		OR			
2(B)		Explain the various losses in three phase induction motor and discuss rotor emf and rotor frequency, rotor current and power factor at standstill and during running conditions.	12	1	2
3(A)		Derive torque equation for Induction Motor? What is the condition for max torque in it?	12	2	4
		OR			
3(B)		A 415V,3 Phase ,50Hz, 4 pole Star connected induction motor runs at 24rev/s on full load. the resistance and reactance per phase are 0.35 ohms and 3.5 ohms respectively and effective rotor -stator turns ratio is 0.85:1. Calculate 1. Slip, 2. The full load torque, 3. The power output if the mechanical losses amount to 770w, 4. The maximum torque, 5. The speed at which maximum torque occurs, 6. Starting torque.	12	2	3
4(A)		Explain the principle of operation of Capacitor start induction motor. Draw the circuit and phasor diagram. State its applications.	12	3	3
		OR			
4(B)		Describe the principle of operation of single-phase split phase induction motor along with torque speed characteristics and its applications.	12	3	2
5(A)		From the following test results, determine the voltage regulation by E.M.F. method of a 2000 V, 1-phase alternator delivering a current of 100 A at: i) Unity power factor ii) 0.8 leading power factor, iii) 0.71 lagging power factor, Test results: Full load current of 100 A is produced on short circuit by a field excitation of 2.5 A. An e.m.f. of 500 V is produced on open circuit by the same excitation. The armature resistance is 0.8 Ω.	12	4	3
		OR			

5(B)		Explain the construction and working principle of Alternator with neat sketch.	12	4	2
6(A)	(i)	What is hunting? State its causes. How it can be minimized?	6	5	2
	(ii)	Derive torque equation in Synchronous motor	6	5	4
		OR			
6(B)		Explain V and Inverted V Curves of Synchronous Motor?	12	5	2

*****END*****

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

Question Paper Code: 23MAT103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

PROBABILITY AND STATISTICS FOR ENGINEERS

(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)	Let A and B be events such that $p(A)=0.5$, $p(B)=0.7$ what must be $p(A\cap B)$ equal for A and B to be independent?	1	1	2
	ii)	Write the necessary and sufficient conditions for a function to be a discrete density.	1	1	1
	iii)	Let X be a Poisson random variable with parameter $k=10$. Find the expression for the density for X.	1	2	2
	iv)	Define gamma distribution.	1	2	1
	v)	Define Statistical independence of two random variables.	1	3	1
	vi)	Define Correlation coefficient.	1	3	1
	vii)	Define Critical region.	1	4	1
	viii)	What is the test statistic used for testing a single proportion?	1	4	1
	ix)	What is the purpose of ANOVA.	1	5	1
	x)	What are the basic principles of experimental design.	1	5	1
2(A)	(i)	State and prove addition theorem for two events	4	1	2
	(ii)	In a bolt factory machines manufacture 25%, 35% and 40% of the total. Of their output 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B, C?	8	1	3
		OR			
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 mean and variance.	12	1	3
3(A)	(i)	Among diabetic, the fasting blood glucose level X may be assumed to be approximately normally distributed with mean 106 milligrams and S. D. 8 milligrams. (a) Find the probability that randomly selected diabetic will have blood glucose level between 90 and 122 mg. (b) Find $P[X\le 120\text{mg}]$	6	2	3
	(ii)	Let X be a Gamma random variable with $\alpha=3, \beta=4$ (a) What is the expression for the density for X? (b) What is the Moment generating function for X? (c) Find μ, σ^2, σ	6	2	3
		OR			
3(B)		Derive moment generating function of Poisson distribution and find its mean and variance	12	2	3
4(A)		Let X denote the normalized thickness of a washer and Y denote the normalized diameter of the hole into which it fits. The joint probability density function for these two dimensions is given by: $f(x,y)=\begin{cases} 8xy & ;0<x<y<1 \\ 0, & otherwise \end{cases}$ (a) Verify that $f(x,y)$ is a valid joint probability density function.	12	3	4

(b) Find the marginal densities for X and Y.
(c) Are X and Y independent?
(d) Find $V(X)$ and $V(Y)$.

OR

4(B) Let X be the number of bearings installed in a gearbox, and Y the number of lubrication checks performed. 12 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

(a) Find the expected values $E[X]$ and $E[Y]$.
(b) Find the conditional probability distribution of X given $Y = 1$.
(c) Find the conditional probability distribution of Y given $X = 2$.

5(A) (i) A manufacturer claimed that at least 95% of the equipment which he supplied to a factory conformed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 were faulty. Test the claim at 5% level of significance. 6 4 3

(ii) In a random sample of 50 machinists, the average time taken to assemble a component is 42 minutes with a standard deviation of 5.8 minutes. Can it be concluded that the average assembly time is less than 40 minutes at the 5% level of significance? 6 4 3

OR

5(B) A quality engineer selects a random sample of 12 steel bolts and measures their tensile strength (in kN). The recorded values are: **82, 88, 91, 95, 90, 85, 92, 89, 93, 87, 94, 90.** The manufacturer claims that the average tensile strength of the bolts is 90 kN. Based on the sample data, test whether the bolts meet the claimed average tensile strength of 90 kN at a 5% level of significance. Find a 95% confidence interval for the true mean tensile strength of bolts based on this sample. 12 4 4

6(A) The following table shows the lives in hours of four brands of electric lamps:
Brand A: 1610, 1610, 1650, 1650, 1680, 1700, 1720, 1800
Brand B: 1580, 1640, 1640, 1700, 1750
Brand C: 1460, 1550, 1600, 1620, 1640, 1660, 1740, 1820
Brand D: 1510, 1520, 1530, 1570, 1600, 1680
By shifting the origin to 1640 in the above-mentioned data, for simplification in calculation, perform an analysis of variance and test the homogeneity of the mean lives of the four brands of lamps. 12 5 4

OR

6(B) The following data represent the number of units of production per day turned out by 4 different workers using 4 different types of machines: 12 5 4

		Machine Type			
		A	B	C	D
Workers	1	44	38	47	36
	2	46	40	52	43
	3	34	36	44	32
	4	43	38	46	33

(a) Test whether the five men differ with respect to mean productivity.
(b) Test whether the mean productivity is the same for four different machine types

END

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

Question Paper Code: 23ME107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

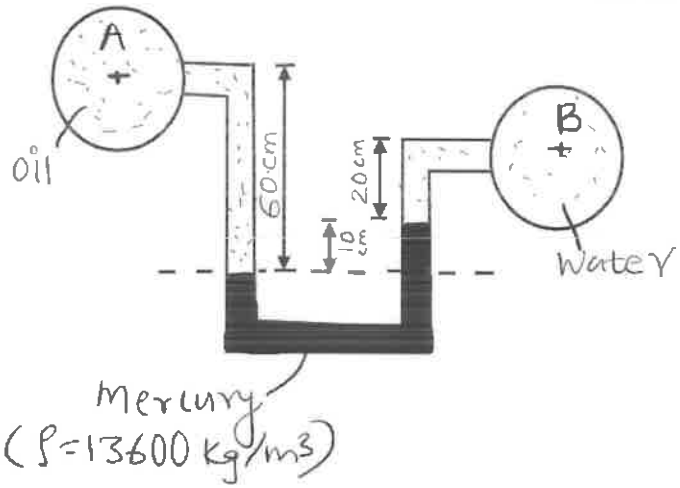
B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

FLUID MECHANICS AND HYDRAULIC MACHINES

(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)	What is kinematic viscosity?	1	1	1
	ii)	What is absolute pressure?	1	1	1
	iii)	What is steady and unsteady flow?	1	2	1
	iv)	What is coefficient of discharge?	1	2	1
	v)	Explain exit and entry loss.	1	3	2
	vi)	Water flows through a horizontal circular pipe with a diameter of 150 mm and a length of 30 meters at a steady flow rate of 0.02 m^3/s. If the friction factor for the pipe is 0.02, calculate the head loss due to friction in the pipe.	1	3	2
	vii)	What is nozzle efficiency?	1	4	1
	viii)	What is the difference between Pelton wheel and Francis turbine	1	4	1
	ix)	What does manometric efficiency of a centrifugal pump represent?	1	5	1
	x)	What is the function of the impeller in a centrifugal pump?	1	5	1
2(A)	(i)	Explain the concept of fluid viscosity and how it influences fluid flow. Also, explain the units of viscosity in the MKS and CGS systems.	6	1	2
	(ii)	A differential manometer contains mercury (density=13600 kg/m^3) is connected to pipes A and B as shown in figure the pipe below. Pipe A contains a liquid of specific gravity 5 and Pipe B contains water. Find the pressure difference between the two pipes. 	6	1	3
		OR			
2(B)		An oil of dynamic viscosity used for lubrication between shat and bearing. The shaft diameter is 40 cm. The shat rotates at 200 rotations per minute. The thickness of the oil is 1.5mm and the length of the bearing is 100mm. Determine the a) Shear force acting on the shaft b) Power loss in bearing due to viscous effect of the oil.	12	1	4
3(A)	(i)	Derive the three dimensional mass conservation or continuity equation for a fluid flow $\frac{\partial \rho}{\partial t}+\frac{\partial(\rho u)}{\partial x}+\frac{\partial(\rho v)}{\partial y}+\frac{\partial(\rho w)}{\partial z}=0$	6	2	3

	(ii)	The velocity vector in fluid flow is given as $V = 2x^3i-10yj+2tk$. Find the velocity and acceleration of fluid particle at (1, 1, 3) at time t=2.	6	2	3
		OR			
3(B)		List all the assumption and derive the Bernoulli's equation for a fluid flow.	12	2	4
4(A)	(i)	Derive the equation for the head loss due to sudden expansion for a fluid flow in a pipe.	6	3	4
	(ii)	Describe the configuration of pipes connected in series and pipes connected in parallel, and explain their differences in terms of discharge and head loss.	6	3	2
		OR			
4(B)		A horizontal pipe line 40m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25m of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300mm. The height of water level in the tank is 8m above the center of the pipe. Consider all head losses which occur, determine the flow rate. Take f=0.01 for both the section of the pipe.	12	3	4
5(A)	(i)	Explain the following: (a) Hydraulic efficiency (b) Mechanical efficiency (c) Nozzle efficiency (d) Overall efficiency	6	4	2
	(ii)	Determine the equation of force and power when a jet strikes a) fixed vertical plate and b) moving vertical plate	6	4	3
		OR			
5(B)		A Pelton wheel is to designed for the following specifications: shaft power 10000 kW, Head 380 m, Speed 750 RPM, overall efficiency 86%, jet diameter is one sixth of wheel diameter. Determine the following (i) The wheel diameter (ii) The number of jets required (iii) Diameter of the jet. Take Cv = 0.98.	12	4	5
6(A)	(i)	A centrifugal pump is to discharge 0.118 m3/s at a speed of 1450 r.p.m. against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.	6	5	4
	(ii)	Explain the difference between centrifugal and reciprocating pump	6	5	2
		OR			
6(B)		A single-acting reciprocating pump operates at a speed of 60 revolutions per minute (rpm) and delivers 0.012 m^3/s of water. The diameter of the piston is 250 mm, and the stroke length is 350 mm. Based on the given data, determine the following: (i) The theoretical discharge of the pump, (ii) The coefficient of discharge, and (iii) The slip and percentage slip of the pump.	12	5	4

END

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

Question Paper Code: 23ME106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

MANUFACTURING TECHNOLOGY-I

(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 function of riser in casting process?	1	1	1
	ii)	Classify pattern materials.	1	1	1
	iii)	Name the important components involved in inert gas welding process.	1	2	1
	iv)	Classify NDT methods.	1	2	1
	v)	What is called forging?	1	3	1
	vi)	Name the components involved in annealing operation.	1	3	1
	vii)	Define rolling force?	1	4	1
	viii)	What is called backward extrusion?	1	4	1
	ix)	Write about the term "blanking."	1	5	1
	x)	Write the different processing techniques of sheet metal forming processes.	1	5	1
2(A)	(i)	List out the applications of casting process.	6	1	2
	(ii)	Sketch the principle of centrifugal casting process.	6	1	2
		OR			
2(B)		Explain the working principle of cupola furnace in detail and state its applications.	12	1	2
3(A)	(i)	Describe the principle of brazing and soldering process with a neat diagram.	6	2	2
	(ii)	List the advantages and dis advantages of plasma arc welding process.	6	2	2
		OR			
3(B)		With the help of neat sketch, Describe the principle of submerged arc welding process.	12	2	2
4(A)	(i)	Illustrate the principle of impression die forging using a neat sketch.	6	3	2
	(ii)	Illustrate the principle of closed die forging in metal process using a neat sketch.	6	3	2
		OR			
4(B)		Interpret the working principle of mechanical press in sheet metal operations using neat sketch.	12	3	2
5(A)	(i)	Differentiate forward and backward extrusion process.	6	4	2
	(ii)	Describe the working principle of tube drawing process?	6	4	2
		OR			
5(B)		Sketch the working principle of different types of rolling mill arrangements using neat sketch.	12	4	2
6(A)	(i)	Interpret the different stages involved in rubber forming process	6	5	2
	(ii)	Explain the working principle of laser cutting process using neat sketch.	6	5	2
		OR			
6(B)		Elaborate the principle of electromagnetic forming process with a neat diagram.	12	5	2

END

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

Question Paper Code: 23ME108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

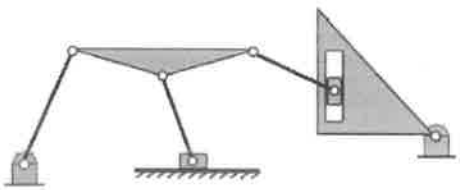
THEORY OF MACHINES

(Mechanical Engineering)

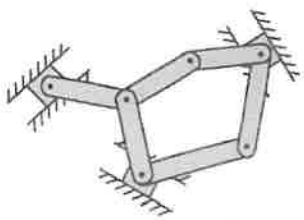
Time: 3Hrs **Max Marks: 70**

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

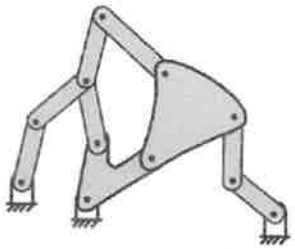
S.No.		Question	Marks	CO	BL
1.	i)	Write down the mathematical relation between link and pair & joint and link.	1M	1	1
	ii)	How Grashof's law is helpful in classifying the four bar mechanisms into different types?	1M	1	2
	iii)	Why do you study velocity and acceleration for a given mechanism?	1M	2	2
	iv)	State the application of angular velocity ratio theorem with suitable example.	1M	2	2
	v)	Define Governor.	1M	2	1
	vi)	The engine of an aero plane rotates in clockwise direction when seen from tail end and the aero plane takes a turn to the left. The effect of gyroscopic couple and the aero plane will be?	1M	3	3
	vii)	When involute interference occurs?	1M	4	2
	viii)	List out the applications of epicyclic gear train.	1M	4	2
	ix)	What are the various types of motions of follower motion?	1M	5	1
	x)	List the classifications of cam followers based on shape.	1M	5	1
2(A)		Determine the number of degrees of freedom for the following mechanisms.	12M	1	3



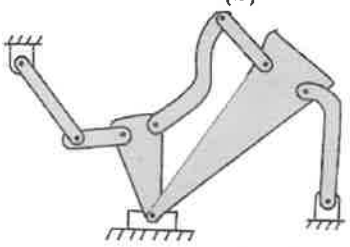
(a)



(b)



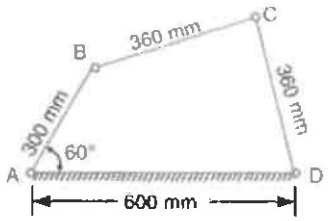
(c)



(d)

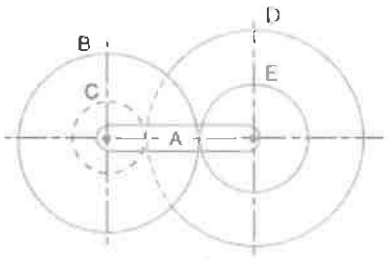
OR

2(B)		Explain with neat sketch any two inversion of four bar chain mechanism.	12M	1	2
3(A)		In a pin jointed four bar mechanism, as shown in Fig. AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. The angle BAD = 60°. The crank AB rotates uniformly at 100 r.p.m. Locate all the instantaneous centres and find the angular velocity of the link BC.	12M	2	3



OR

3(B)	The crank of a slider crank mechanism rotates clockwise at a constant speed of 150 rpm. The crank is 200 mm and the connecting rod is 700 mm long. Determine the angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead center position.	12M	2	3
4(A)	The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor.	12M	3	3
	OR			
4(B)	An aircraft makes a half circle of 50 m radius towards left, when flying at 200 km/hr. The engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 3000 rpm clockwise when viewed from the rear. Find the gyroscopic couple and its effect on the aircraft.	12M	3	3
5(A)	A pair of gears, having 40 and 30 teeth respectively are of 25° involute form. The addendum length is 5 mm and the module pitch is 2.5 mm. If the smaller wheel is the driver and rotates at 1500 r.p.m., find the velocity of sliding at the point of engagement, at the point of pitch and at the point of disengagement.	12M	4	3
	OR			
5(B)	In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise.	12M	4	3



6(A)	Four masses m1, m2, m3 and m4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45°, 75° and 135°. Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.	12M	5	3
	OR			
6(B)	A cam is to give the following motion to a knife-edged follower: 1. Outstroke during 60° of cam rotation; 2. Dwell for the next 30° of cam rotation; 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft	12M	5	4

*****END*****

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

Question Paper Code: 23ECE105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech. II Year II Semester (R23) Regular End Semester Examinations, June 2025

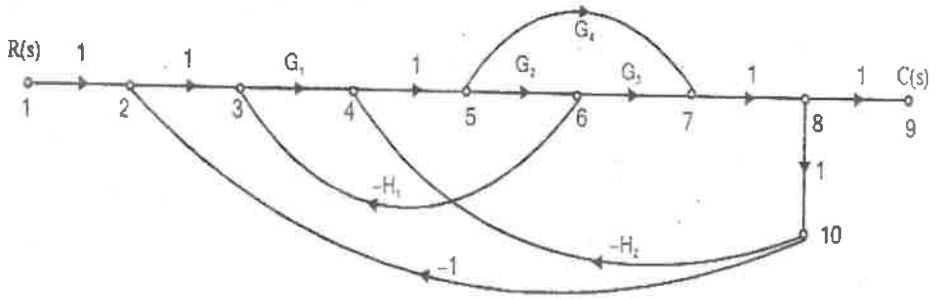
LINEAR CONTROL SYSTEMS

(ECE)

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

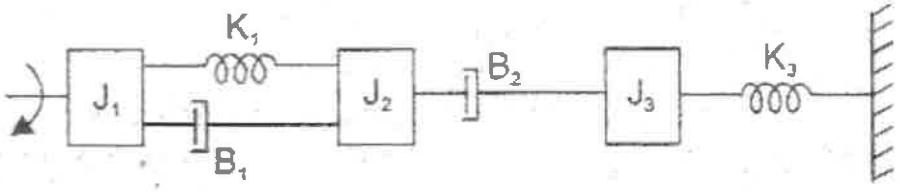
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S.No.		Question	Marks	CO	BL
1.	i.	Define open loop control system.	1	1	1
	ii.	Write Mason's gain formula.	1	1	1
	iii.	Sketch the response of second order under damped system and define Rise Time (tr)	1	2	2
	iv	Define PID controller and explain its effect on system's response.	1	2	1
	v.	What is Routh-Hurwitz stability criterion?	1	3	1
	vi	What is the requirement for BIBO stability?	1	3	1
	vii.	What is the phase and Gain cross-over frequency?	1	4	1
	viii.	Draw the polar plot of $G(s)=\frac{1}{(1+sT)}$	1	4	1
	ix.	Define state and state variable for a space model of control systems?	1	5	1
	x.	Define controllability & observability of the system.	1	5	1
2(A)		Obtain the overall gain of the system represented by signal flow graph shown in the below figure using Mason's gain formula.	12	1	3



OR

2(B)		Write the differential equation governing the mechanical system shown in Fig. Draw the torque-voltage and torque-current electrical analogous circuits and verify writing mesh and node equations.	12	1	3



3(A)	(i)	Open loop transfer function of a system with unity feedback is $G(s)=\frac{10}{s\,(1+0.2s+s^2)}$. What is steady state error of the system when it is subjected to an input $r(t)=3+t+t^2$.	6	2	3
	(ii)	Derive the expression of peak time for a unit step response of a second order system.	6	2	3

OR

3(B)		A unity feedback control system has an open loop transfer function, $G(s)=\frac{10}{s(s+2)}$. Find the rise time, percentage overshoot, peak time and settling time for a step input of 10 units.	12	2	3
4(A)	i.	Determine the stability of the system using routh array whose characteristic equation is given by $3s^4+10s^3+5s^2+5s+2=0$. Also comment on location of roots in s-plane.	6	3	3
	ii.	State Hurwitz stability criteria. Comment on the stability of a system which has characteristic equation $s^4+8s^3+18s^2+16s+5=0$	6	3	3
		OR			
4(B)		Sketch the root locus for a unity feedback system with open loop transfer function $G(s)=\frac{K}{s\,(4+s)(24+10s+s^2)}$	12	3	3
5(A)		Plot the Bode diagram for the transfer function $G(s)=\frac{10}{s(1+0.1s)(1+0.4s)}$ and obtain the gain cross over frequency, phase cross over frequency, gain margin and phase margin.	12	4	3
		OR			
5(B)	i.	The open loop transfer function of a negative unity feedback system is given by, $G(s)H(s)=\frac{1}{s(1+s)(1+2s)}$ Sketch the polar plot and determine the gain margin and phase margin.	12	4	3
6(A)	i.	(i) Determine the state space representation of the system whose transfer function is $\frac{Y(s)}{U(s)}=\frac{s+4}{s^2+5s+6}$.	6	5	3
	ii.	Explain briefly about the controllability of linear system with suitable examples.	6	5	3
		OR			
6(B)		What are the advantages of state space model of a system? Obtain the state space model of a system whose closed loop transfer function is $T(s)=\frac{10(s+4)}{s\,(1+s)(3+s)}$	12	5	3

*****END*****

'l Ticket No: | | | | | | | | | | |

Question Paper Code: 23ECE107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June 2025

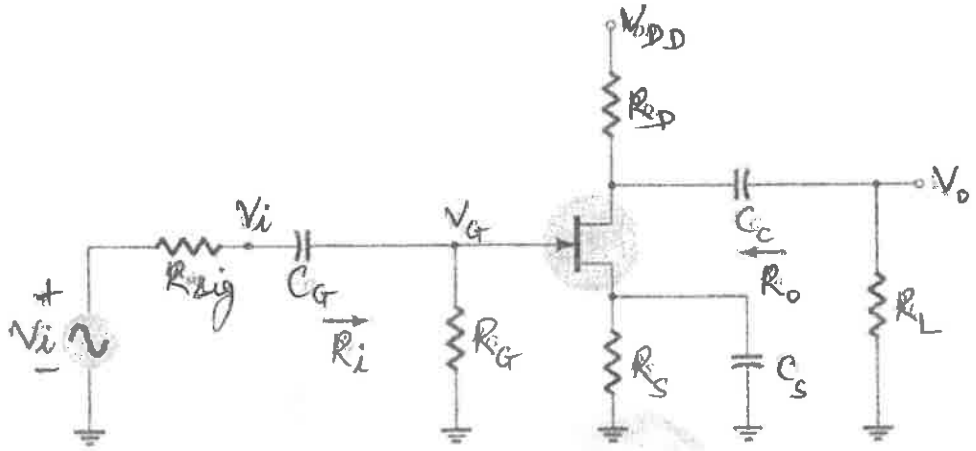
ANALOG CIRCUITS

(ECE)

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.	Why is RC coupling preferred in multistage amplifiers?	1M	1	1
	ii.	Define and draw the circuit diagram of inverse active region of the npn transistor.	1M	1	2
	iii.	What is the role of Bypass capacitors in amplifiers?	1M	2	2
	iv	Model the Miller effect with suitable example.	1M	2	1
	v.	Define cut-off frequency.	1M	3	1
	vi	State any one property of negative feedback in amplifiers.	1M	3	2
	vii.	What is the frequency of oscillation for a phase shift oscillator?	1M	4	1
	viii.	In an RC phase shift oscillator, if $R_1 = R_2 = R_3$ is 500 KΩ and C_1 and C_2 and $C_3 = 20\ \mu F$. Find the frequency of oscillator.	1M	4	1
	ix.	Why is Class B more efficient than Class A?	1M	5	1
	x.	List any one application of tuned amplifiers.	1M	5	2
2(A)		Sketch the circuit diagram of two stage RC coupled CE-CE cascade amplifier using BJT and explain the working principle, derive the equation for the overall voltage gain of the amplifier. Also, write the advantage and disadvantage of RC coupled amplifier.	12M	1	3
		OR			
2(B)		Draw the circuit diagram of BJT differential amplifier and obtain the A_d, A_{cm}, and CMRR.	12M	1	3
3(A)		Explain the low-frequency response of CE amplifiers. Derive the expression for the lower cut-off frequency.	12M	2	2
		OR			
3(B)		Determine the lower cut-off frequency and mid-band gain for the network show in the figure using the following parameters: C_G = 0.01 mF, C_C = 0.5 mF, C_S = 2 mF, R_{sig} = 10 k Ω, R_G = 1 MΩ, R_D = 4.7 kΩ, R_S = 1 kΩ, R_L = 2.2 kΩ, I_{DSS} = 8 mA, V_P = -4 V, $r_d = \infty\Omega$, V_{DD} = 20 V.	12M	2	2



4(A)	Explain the shunt-series and series-shunt feedback topologies with examples.	12M	3	3
	OR			
4(B)	Analyse the voltage shunt feedback amplifiers and derive the expression for gain, input & output resistance.	12M	3	3

5(A)	Draw and explain the circuit of a Wien Bridge oscillator. Derive the expression for frequency of oscillation.	12M	4	4
	OR			
5(B)	A crystal has the following parameters L = 0.5 H, C_S = 0.06 PF, C_P = 1 PF and R = 5 KΩ. Determine the series and parallel resonant frequencies and a factor of the crystal.	12M	4	4
6(A)	Compare Class A, Class B, and Class AB power amplifiers in terms of efficiency and output waveform.	12M	5	3
	OR			
6(B)	Write shorts note on Power BJTs and Class AB power amplifier.	12M	5	3

*****END*****

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

Question Paper Code: 23ECE106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June 2025

EM WAVES AND TRANSMISSION LINES

(ECE)

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.	What is the coulomb's law and write the expression of the coulomb's law?	1	1	1
	ii.	What is the Laplace's equations?	1	1	1
	iii.	What is the expression for the energy in a magneto-static field?	1	2	1
	iv	What is the unit of magnetic charge?	1	2	1
	v.	What is lossy dielectric medium?	1	3	1
	vi	Define group velocity.	1	3	1
	vii.	Find the reflection coefficient of a 50 ohm transmission line when it is terminated by a load impedance of 60+j40 ohm.	1	4	1
	viii.	What is the relationship between characteristic impedance and propagation constant?	1	4	1
	ix.	What is the range of values of standing wave ratio and reflection coefficient?	1	5	1
	x.	Give reasons for preferring a short-circuited stub when compared to an open-circuited stub.	1	5	1
2(A)		State the Coulomb's Law and derive the expression for the electric field intensity due to a point charge. Discuss the significance of the electric field intensity in electrostatics	12	1	3
		OR			
2(B)		Apply Gauss's Law to compute the electric field for a uniformly charged sphere, infinite cylinder, and infinite planar sheet, specifying the Gaussian surface and symmetry considerations for each.	12	1	3
3(A)		(i). Apply about boundary surface condition for magnetic field? (ii). State the Ampere's circuital law? Explain about different applications of Ampere's circuital law?	12	2	3
		OR			
3(B)		Apply Biot-Savart's Law to determine the expression for the magnetic field intensity at a point P due to a straight filamentary current-carrying conductor. Illustrate the steps involved in the derivation and explain the physical interpretation of each term	12	2	3
4(A)		Apply Maxwell's equations to derive the wave equation for the electric field in both a conducting medium and in free space. Highlight the differences in the resulting expressions and explain their physical significance.	12	3	3
		OR			
4(B)		Apply the nature of a wave which is incident Normally on perfect conductor and lossy dielectrics.	12	3	3

5(A)	Derive the characteristic impedance and propagation constant for a transmission line, and explain their roles in wave propagation.	12	4	3
	OR			
5(B)	Derive the transmission line equations for current and voltage.	12	4	3
6(A)	Develop a step-by-step derivation of the expression for the input impedance (Zin) of a transmission line, clearly relating it to the characteristic impedance (Z0), the electrical length of the line, and the terminating load impedance (ZL). Illustrate your explanation with examples of how the input impedance changes for open-circuited and short-circuited transmission lines.	12	5	4
	OR			
6(B)	A 50Ω lossless transmission line is terminated in a load impedance of ZL= (25 +j50) Ω. Use the SMITH chart to find i) reflection coefficient ii). VSWR iii) input impedance of the line, given that the line is 3.3λ long iv) input admittance of the line	12	5	3

*****END*****

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

Question Paper Code: 23ECE108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June 2025

ANALOG COMMUNICATION

(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

S.No.		Question	Marks	CO	BL
1.	i.	Write the expressions for mean and variance of a random variable.	1	1	2
	ii.	State any two properties of autocorrelation function.	1	1	1
	iii.	Why VSB is needed, especially for video transmission by AM?	1	2	2
	iv	Define the term 'Noise Figure'.	1	2	1
	v.	Define Phase Modulation and write the expression.	1	3	1
	vi	How does wideband FM differ from narrowband FM?	1	3	2
	vii.	What is the purpose of a reconstruction filter?	1	4	1
	viii.	Define Nyquist rate.	1	4	1
	ix.	What is the need for source coding?	1	5	2
	x.	Define minimum distance of a channel code.	1	5	2
2(A)	i.	Explain the concept of stationary random process.	6	1	3
	ii.	Describe the transmission of a random process through a linear time-invariant (LTI) system.	6	1	3
		OR			
2(B)	i.	(a) Discuss the significance of Gaussian RV. (b) The PDF of a Gaussian variable is X is given as $p_X(x) = \frac{1}{3\sqrt{2\pi}} e^{-\left[\frac{(x-4)^2}{18}\right]}$ Determine: (i) $P(x \geq 4)$ (ii) $P(x \leq 0)$ (iii) $P(x \geq -2)$	12	1	3
3(A)	i.	Describe the working of a Tuned Radio Frequency (TRF) receiver. List its limitations.	6	2	3
	ii.	A Super heterodyne receiver is tuned to f_s =555 kHz. Its local oscillator frequency is 1010 kHz. Calculate the IRR when the antenna of this receiver is connected to a mixer through a tuned circuit whose quality factor is 50.	6	2	3
		OR			
3(B)		Discuss the noise performance of Conventional AM receiver system with suitable diagram.	12	2	3
4(A)	i.	Explain the process of frequency modulation (FM) and its demodulation techniques.	6	3	3
	ii.	Analyze the noise performance of FM by deriving a suitable mathematical expression for the Figure of Merit.	6	3	4
		OR			
4(B)		Discuss the pre-emphasis and de-emphasis in FM communication.	12	3	3

5(A)	i.	Explain about natural sampling and flat-top sampling with suitable circuits and waveform sketches.	6	4	3
	ii.	Twenty-four voice signals are sampled uniformly and then time division multiplexed with PAM/TDM. The highest frequency of each voice signal is 3.4 KHz and sampling rate of f_s = 8kHz. a) Calculate the transmission bandwidth of TDM channel. b) Calculate the sampling interval. c) Calculate the time allotted to each channel. d) Calculate the pulse rate (signaling rate).	6	4	3
		OR			
5(B)		With suitable diagram and sketches, Describe the Modulation and Demodulation of PPM signal.	12	4	3
6(A)	i.	Explain Shannon Fano coding. Describe the steps with an example.	6	5	3
	ii.	A source emits symbols in the binary format with probabilities P(Xi) as given in Table below.	6	5	4

Xi	M	A	D	N	P	L	E
P(Xi)	0.20	0.30	0.02	0.15	0.08	0.07	0.18

a) Apply Huffman coding and determine the output code for the string "MADANAPALLE"

b) Compute the data rate of the signal before and after Huffman coding. What compression factor has been achieved?

OR

6(B)		State and derive the Shannon-Hartley theorem for the capacity of a band-limited AWGN channel.	12	5	3

*****END*****

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

Question Paper Code: 23CSE108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

SOFTWARE ENGINEERING

(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

S.No.		Question	Marks	CO	BL
1.	i)	Define software engineering.	1	1	1
	ii)	Address the key features of the Waterfall model.	1	1	2
	iii)	What is risk management in software projects?	1	2	1
	iv)	Define software size metrics.	1	2	1
	v)	List out the characteristics of a good user interface.	1	3	2
	vi)	What is Cohesion?	1	3	1
	vii)	What is code review?	1	4	1
	viii)	Define software reliability.	1	4	1
	ix)	What is reusability?	1	5	1
	x)	Write the benefits of CASE.	1	5	2
2(A)	(i)	Describe the evolution of software engineering and explain why it emerged as a discipline.	6	1	2
	(ii)	Illustrate the notable changes in software development practices.	6	1	3
		OR			
2(B)		Describe the Spiral model in detail. What risks does it address better than other models?	12	1	2
3(A)	(i)	Discuss the complexities involved in software project management	6	2	2
	(ii)	Explain the significance of software metrics in project planning and control.	6	2	2
		OR			
3(B)		Enumerate and explain the key responsibilities of a software project manager throughout the software development life cycle.	12	2	3
4(A)	(i)	Describe the steps in developing the Data Flow Diagram (DFD) model of a system.	6	3	2
	(ii)	Illustrate SA/SD methodology significance in structured software development.	6	3	3
		OR			
4(B)		Explain Extreme Programming (XP) with its key practices, and how do they support rapid and reliable software delivery.	12	3	2
5(A)	(i)	Compare Black-Box and White-Box testing. Provide suitable examples where each technique is most effective.	6	4	3
	(ii)	Explain the role of program analysis tools in software testing.	6	4	2
		OR			
5(B)		Discuss the components of a Software Quality Management System (SQMS). How does it ensure continuous quality improvement?	12	4	2
6(A)		Describe a software maintenance process model. How does it differ from the software development life cycle (SDLC)?	12	5	2
		OR			
6(B)		Illustrate the architecture of a CASE environment. How does it support different phases of the software development life cycle?	12	5	3

END

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

Question Paper Code: 23CSE106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

DATABASE MANAGEMENT SYSTEMS

(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

S.No.		Question	Marks	CO	BL
1.	i)	What is the difference between a schema and an instance?	1	1	1
	ii)	Define data independence in the context of a database system.	1	1	1
	iii)	Define primary key in relational database.	1	2	1
	iv)	Define the terms tuples and attributes in the relational model.	1	2	1
	v)	Define nested queries.	1	3	1
	vi)	List the SQL functions.	1	3	1
	vii)	What is the main purpose of normalization in database design?	1	4	1
	viii)	Define functional dependency.	1	4	1
	ix)	List the operations of transaction.	1	5	1
	x)	What is serializability?	1	5	1
2(A)	(i)	Explain in detail about Database system structure with neat diagram	6	1	2
	(ii)	Demonstrate with an example scenario that includes key constraints, weak entities, class hierarchy and aggregation of ER model.	6	1	3
		OR			
2(B)		Explain the different types of data models used in database systems and their significance in data representation.	12	1	2
3(A)	(i)	Utilize various relational algebra operations to retrieve specific student details from a university database	6	2	3
	(ii)	Identify the various role of NULL values in a relational database. How does their presence impact constraints like Key and Integrity constraints.	6	2	4
		OR			
3(B)		Construct the SQL Queries for following set of tables: EMPLOYEE (EmpNo, EName, DoB, Address, Gender, Salary, DNo) and DEPARTMENT (DNo, Dname, ManagerEmpNo, MnagerStartDate). i) Display all employees in Department named 'Computer Science'. ii) Display the name of highest salary paid 'male' employee. iii) Which employee is oldest manger in company? iv) Display the name of department of the employee 'SRINIVAS' v) Display the Age of 'female' employees Update the employee's salary by 10%	12	2	3
4(A)	(i)	Demonstrate in detail about different types of JOIN operations.	6	3	4
	(ii)	Explain in detail about Aggregation operations with examples.	6	3	2
		OR			
4(B)		What is relational set? Identify the various operations with examples	12	3	3

5(A)	(i)	Examine the relation R(A, B, C, D, E, F, G, H, I, J) with the set of functional dependencies: AB → C, A → DE, B → F, F → GH, and D → IJ. Dissect the dependencies to identify any violations of Boyce-Codd Normal Form (BCNF), and simplify the relation by applying the appropriate decomposition steps. List the final set of relations while preserving dependency and ensuring lossless decomposition.	6	4	4
	(ii)	Explain in detail about functional dependencies with suitable examples	6	4	3
		OR			
5(B)		What is Normalization? Examine the concept of normalization and its various types with examples.	12	4	4
6(A)	(i)	Explain the ACID properties of transactional database system with a suitable example.	6	5	4
	(ii)	Demonstrate in detail about B+ trees.	6	5	3
		OR			
6(B)		Analyze the Hash Based Indexing with suitable examples.	12	5	4

*****END*****

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

Question Paper Code: 23MAT108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

DISCRETE MATHEMATICAL STRUCTURES

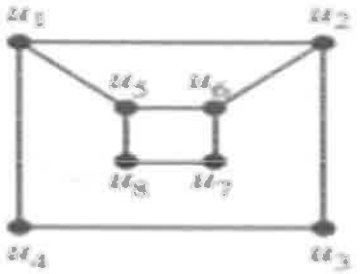
(Common to CSE, CSE-AI, CSE-DS, CSE-AI&ML, CSE-N)

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

S.No.		Question	Marks	CO	BL
1.	i)	Calculate the truth value for $(p \to q) \leftrightarrow (\neg q \to \neg p)$ when p is false, q is true.	1	1	1
	ii)	Write the Disjunctive Syllogism rule for inference theory.	1	1	1
	iii)	Give an example of a group and semigroup.	1	2	1
	iv)	Identify a cyclic group of order 6.	1	2	2
	v)	For a finite set with 2 elements, how many possible relations can be defined on it?	1	3	1
	vi)	Construct a two-element Boolean algebra.	1	3	1
	vii)	Determine the sequence $\{a_n\}$ for the generating function $\frac{1}{1-x}$.	1	4	1
	viii)	Write the Fibonacci sequence.	1	4	1
	ix)	Draw a bipartite graph with a bipartition $\{1,2\}$ and $\{3,4,5\}$.	1	5	1
	x)	Find the adjacent matrix for a simple undirected graph with 3 vertices that has 3 edges.	1	5	1
2(A)	(i)	Apply Logical Connectives to verify that the logical propositions $(p \vee q) \leftrightarrow (r \vee p)$ and $[p \to (q \wedge r)] \leftrightarrow [(p \to q) \wedge (p \to r)]$ are independent or not.	6	1	3
	(ii)	Use truth value tables to show that the logical propositions $P \leftrightarrow Q$ and $(P \wedge Q) \vee (\neg P \wedge \neg Q)$ are logically equivalent.	6	1	3
		OR			
2(B)		Construct a truth table for A: $[(P \to Q) \vee (R \to P)]$ and B: $\neg Q \vee \neg R$, and use these tables to determine whether the compound propositions $A \wedge B$ and $A \vee B$ are a *tautology*, *contradiction*, or *contingency*.	12	1	3
3(A)	(i)	Show that the operation $\star$ on a set of rationales Q is defined by a rule $a \star b = \frac{ab}{a+b+1}$ is a binary operation, and analyze whether this operation is associative and commutative.	6	2	3
	(ii)	Analyze the algebraic structures $(P(A), \cup)$ and $(P(A), \cap)$, where $P(A)$ is the power set of a non-empty set A. Prove that each forms an abelian monoid, clearly identifying the identity elements.	6	2	3
		OR			
3(B)		Analyze the subgroup structure of the symmetric group S_3. Identify all subgroups and proper subgroups of $(S_3, \circ)$, and classify them according to their order.	12	2	3
4(A)	(i)	Describe equivalence classes of a finite set and its corresponding partitions with a suitable example, and determine the petitions of one, two, and three element sets.	6	3	3
	(ii)	Describe the equivalence classes of 2, 1/4, and $-1/4$ when xRy if and only if $(x-y) \in Z$ defines an equivalence relation on the set Q of rational numbers.	6	3	3
		OR			

4(B)		Construct the Hasse diagrams of the ordered structures $P(\{0,1,2\})$ and D_{30}. Prove that both form Boolean algebras and establish a structurally equivalent map between them.	12	3	3
5(A)	(i)	Explain sequences and their corresponding recurrence relations. Show that $a_n = 5a_{n-1} - 6a_{n-2}$ for all integers n with $n \geq 2$ is the recurrence relation for the sequence $\{a_n\}$ where $a_n = 2^n + 5 \cdot 3^n$, $n = 0, 1, 2, \ldots$	6	4	3
	(ii)	Discuss the Fibonacci sequence $\{f_n\}$ and derive its corresponding recurrence relation, and verify that the relations $f_{n-1} = f_{n+1} + f_{n+2}$ and $f_n = f_{n+1} + f_{n+2}$ are recurrence relations of the Fibonacci sequence $\{f_n\}$ or not.	6	4	3
		OR			
5(B)		Use generating functions to find a closed-form solution for a_n, where a_n satisfies the recurrence relation: $a_n = 3a_{n-1}$, $a_0 = 1$ and $a_n = 8a_{n-1} + 10^{n-1}$, $a_0 = 1$.	12	4	3
6(A)	(i)	Construct the simple undirected graphs of adjacency matrices $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ and $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$.	6	5	3
	(ii)	Analyze the concept of vertex degree and degree sequence in the context of simple undirected graphs. Determine whether the given sequences (4, 3, 3, 2, 2) and (5, 4, 3, 2, 1, 0) are graphical or not. If the sequence is graphical, then construct a corresponding simple undirected graph.	6	5	3
		OR			
6(B)		Given two simple graphs G and H, analyze and determine whether they are isomorphic by comparing degree sequences, adjacency relationships, and substructures like cycles and paths.	12	5	3



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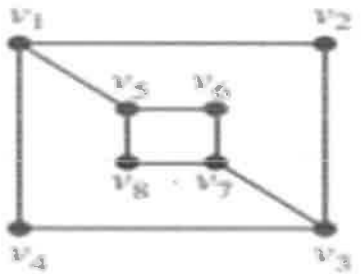

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Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 23CST105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

OPERATING 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

S.No.		Question	Marks	CO	BL
1.	i)	Mention any two OS services	1	1	1
	ii)	What is meant by scheduler?	1	1	1
	iii)	When a race condition arises.	1	2	2
	iv)	List any three advantages of multithreading.	1	2	1
	v)	What is the reader-writer problem?	1	3	1
	vi)	How does Banker's algorithm avoid deadlock	1	3	2
	vii)	What is fragmentation?	1	4	1
	viii)	How does compaction reduce fragmentation	1	4	2
	ix)	How is disk efficiency related to file system performance?	1	5	2
	x)	Compare iOS and Android in terms of file management.	1	5	2
2(A)		Classify the Positional Parameters and argument Validation process in detail.	12	1	3
		OR			
2(B)		Explain the concepts of Decision Making and any two repetition Statements in Korn Shell Programming	12	1	2
3(A)		Illustrate context switching with an example and explain its importance in multitasking.	12	2	3
		OR			
3(B)		Given a set of processes with burst times, apply the Priority Scheduling algorithm and calculate the waiting and turnaround Time:	12	2	3

Process	Arrival Time	Burst Time	Priority
P1	0	10	3
P2	1	1	1
P3	2	2	4
P4	3	1	2

4(A)		Analyse the advantages and disadvantages of deadlock prevention versus deadlock detection.	12	3	4
		OR			
4(B)		Explain the importance of Resource Allocation Graph in detail.	12	3	3
5(A)		Apply the LRU page replacement algorithm to a given reference strin And compute the number of page faults **Page reference string**: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2 **Number of frames**: 3	12	4	3
		OR			
5(B)	i	Explain internal and external fragmentation with examples	6	4	3
	ii	Analyse the role of the working set model in minimizing page faults	6	4	3
6(A)		What is a file? Why do we need them? Write and explain any two file allocation methods in detail.	12	5	2
		OR			
6(B)		What is a directory? In what way does it differ from the file? Explain any one directory implementation in detail.	12	5	2

END

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

Question Paper Code: 23CST106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

COMPUTER NETWORKS

(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

S.No.		Question	Marks	CO	BL
1.	i)	Tell the criteria used to evaluate transmission medium.	1	1	1
	ii)	Define Simplex, Half-Duplex and Full-Duplex.	1	1	1
	iii)	What is HDLC?	1	2	1
	iv)	Outline the services provided by the Data link layer.	1	2	1
	v)	Find the class of each address. (a) 00000001 00001011 00001011 11101111 (b) 14.23.120.8	1	3	2
	vi)	What are the responsibilities of network layer?	1	3	1
	vii)	Define Congestion.	1	4	1
	viii)	What are the two categories of QoS attributes?	1	4	1
	ix)	State the role of DNS	1	5	1
	x)	Why is an application such as POP needed for electronic messaging?	1	5	1
2(A)		Explain the ISO-OSI model of computer network with a neat diagram.	12	1	2
		OR			
2(B)		Discuss various types of networks topologies in computer network.	12	1	2
3(A)	(i)	Discuss the role of Logical Link Control (LLC) in Ethernet networks. How does it ensure reliable data transmission?	6	2	3
	(ii)	Explain about Bridge, Switch and its features in detail.	6	2	2
		OR			
3(B)		Define a checksum and explain its role in error detection. How a checksum is calculated for a series of data units? Illustrate your explanation with an example using the following 4-bit data blocks: 1001, 1101, and 0110.	12	2	4
4(A)	(i)	Compare and contrast IPv4 and IPv6 addressing schemes.	6	3	3
	(ii)	Explain the design issues in the network layer and their impact on communication.	6	3	2
		OR			
4(B)		Why subnetting is necessary? With suitable example, develop the concept of subnetting in class B network.	12	3	4
5(A)	(i)	Draw a TCP state transition diagram for connection management.	6	4	3
	(ii)	Analyze the various duties of Transport Layer.	6	4	4
		OR			
5(B)		Write short notes on User Datagram Protocol (UDP).	12	4	2
6(A)	(i)	Discuss the File transfer Protocol (FTP) with a neat diagram.	6	5	2
	(ii)	Explain briefly simple network management protocol.	6	5	2
		OR			
6(B)		Explain the concept of firewalls and their role in network security. Provide examples of different types of firewalls.	12	5	2

END

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

Question Paper Code: 23CST104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

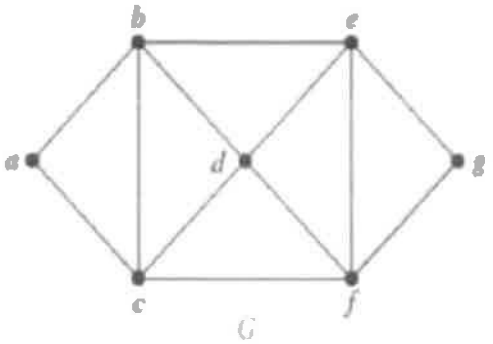
DESIGN AND ANALYSIS OF ALGORITHMS

(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

S.No.		Question	Marks	CO	BL
1.	i)	Distinguish between Algorithm and Pseudocode	1	1	1
	ii)	Why is Worst Case Analysis Mostly Used?	1	1	1
	iii)	Compare the Time Complexity of Merge Sort, Quick Sort and Binary Search.	1	2	2
	iv)	State Convex Hull Problem.	1	2	1
	v)	What distinguishes 0/1 Knapsack from Fractional Knapsack?	1	3	1
	vi)	State one use of Dynamic Programming in real life.	1	3	1
	vii)	Mention any 4 methods that uses backtracking.	1	4	1
	viii)	Define Knapsack problem	1	4	1
	ix)	What is NP-Hard?	1	5	1
	x)	What does it mean for a problem to be NP-Complete?	1	5	1
2(A)	(i)	Illustrate the working of the substitution method with an example. Use it to solve $T(n) = 4T(n/2) + n^2$.	6	1	4
	(ii)	Explain how algorithm analysis affects algorithm selection. Compare two sorting algorithms and justify your choice based on complexity.	6	1	3
		OR			
2(B)		Explain how asymptotic notation helps in comparing two algorithms. Compare the time complexities of bubble sort and merge sort.	12	1	2
3(A)	(i)	Use the divide and conquer technique to find the maximum and minimum in the array [5, 12, 7, 47, 90, 3]. Explain your approach and derive its complexity.	6	2	3
	(ii)	Find the closest pair of points using divide and conquer from the set: (2,3), (6,8), (12,15), (3,6), (7,2). Show the splitting and comparison process.	6	2	4
		OR			
3(B)		Implement the Merge Sort algorithm with an example. Explain the recursive breakdown and analyze its time complexity.	12	2	3
4(A)	(i)	Compare Greedy vs Dynamic Programming solutions on the Knapsack Problem. Solve both approaches using: Weights = {52, 43, 24, 22}, Profits = {40, 50, 100, 45}, Capacity = 100.	6	3	4
	(ii)	Apply dynamic programming approach to solve the Travelling Salesperson Problem (TSP) for 4 cities and a cost matrix.	6	3	2
		OR			
4(B)		Solve the 0/1 knapsack problem using the greedy method for Weights = {10, 20, 30}, Profits = {60, 100, 120}, Capacity = 50.	12	3	3

5(A)	(i)	Solve the Sum of Subsets Problem using backtracking for the set {5, 10, 12, 13, 15, 18} with sum = 30.	6	4	4
	(ii)	Implement a backtracking method to solve the Combination Sum problem for candidates = {2, 3, 6, 7} and target = 7. Show all valid paths.	6	4	3
		OR			
5(B)		Demonstrate how to use backtracking to solve the Graph Coloring problem for  G	12	4	4
6(A)	(i)	Describe the 0/1 Knapsack Problem using Branch and Bound. Show how bounding helps improve performance.	6	5	2
	(ii)	How Randomized Quick Sort works. Show the partitioning process with an array of 6 elements.	6	5	3
		OR			
6(B)		Compare and contrast the complexity classes P and NP with examples.	12	5	4

*****END*****

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

Question Paper Code: 23MAT107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

PROBABILITY AND STATISTICS FOR COMPUTER SCIENCE

(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

S.No.		Question	Marks	CO	BL
1.	i)	Define Axiomatic definition of probability.	1	1	1
	ii)	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?	1	1	2
	iii)	What are the physical conditions for applying geometric distribution.	1	2	1
	iv)	Area of normal curve between $\mu - 3\sigma$ and $\mu + 3\sigma$ is	1	2	1
	v)	Write necessary and sufficient conditions of continuous joint density.	1	3	1
	vi)	Define statistical independence of two random variables.	1	3	1
	vii)	Define coefficient of Kurtosis.	1	4	1
	viii)	Find out coefficient of correlation if $b_{YX} = 3.5, b_{XY} = 0.5$	1	4	2
	ix)	What is Level of Significance in hypothesis testing.	1	5	1
	x)	What is the standard error, If P=0.5 and the sample size is 250 ?	1	5	2
2(A)	(i)	In studying the causes of power failures, these data have been gathered: 5% are due to transformer damage, 80% are due to line damage, 1% involves both problems. Based on these percentages, approximate the probability that a given power failure involves: (a) Line damage given that there is a transformer damage (b) Transformer damage given that there is line damage (c) Transformer damage given that there is no line damage. (d) Transformer damage or line damage.	4	1	3
	(ii)	The blood type distributions in the United States are 41% of type A, 9% of type B, 4% of type AB and 46% of type O. It is estimated that during World War-II, 4% of inductees with type O blood were typed as A; 88% of those with type A were correctly typed; 4% with type B blood were typed as A; 10% with type AB were typed as A. A soldier was wounded and brought to surgery. He was typed as having type A blood. What is the probability that this is his true blood type?	8	1	3
		OR			
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: 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) Determine distribution function (c) Find $p(X \le 4)$ and $p(2 < X \le 7)$. (d) $E(X)$, $E(X^2)$ and σ_X^2	12	1	3
3(A)	(i)	Derive the moment generating function of geometric distribution and find its mean, variance.	6	2	3
	(ii)	If 'X' is a Poisson variate $p(X=2) = \frac{2}{3}p(X=1)$ find $p(X=0)$, $p(X=3)$.	6	2	3

OR

3(B)	(i)	Derive the moment generating function of exponential distribution.	6	2	3
	(ii)	Let X be a Gamma random variable with $\alpha = 3, \beta = 4$ a) What is the expression for the density for X? b) Derive the moment generating function for X? c) Find μ, σ^2, σ	6	2	3
4(A)		For the following bivariate probability distribution find (i) $E(X)$, $E(Y)$ (ii) V(X), V(Y) (iii) $Cov(X,Y)$ (iv) Are X & Y independent?	12	3	4

	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

4(B)		Given the function $f_{X,Y}(x,y) = k(x+y)^2$; $-1 < x < 1$ *and* $-3 < y < 3$ is a valid joint density function. Find (a) the constant k (b) the marginal density functions $f_X(x)$ and $f_Y(y)$ (c) Find $E(X)$, E(Y) and $Cov(X,Y)$	12	3	4
5(A)	(i)	Calculate the rank correlation coefficient for the following data:	8	4	3

X	68	64	75	50	64	80	75	64	58	40
Y	70	68	80	70	75	90	70	50	60	55

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

OR

5(B)		Calculate the first four moments of the following distribution about the mean:	12	4	4

x	0	1	2	3	4	5	6	7	8
f	2	8	25	70	90	70	25	8	2

Also calculate β_1 and β_2.

6(A)	(i)	A random sample of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5% level of significance.	6	5	3
	(ii)	In a random sample of 60 workers, the average time taken by them to complete the work is 40 minutes with a standard deviation of 6.5 minutes. Can you say that work will complete with in 38 minutes at 5% level of significance?	6	5	3

OR

6(B)		Two independent samples of sizes 7 and 6 have the values: **Sample A:** 28 30 32 33 33 29 34 **Sample B:** 29 30 30 24 27 29 Is the difference between the means of samples significant?	12	5	4

*****END*****

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

Question Paper Code: 23CAI105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

MACHINE LEARNING

(CSE-Artificial Intelligence)

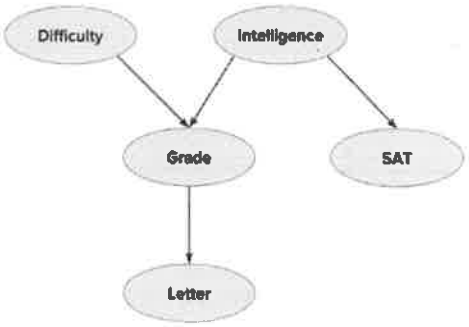
Time: 3Hrs **Max Marks: 70**

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

S.No.		Question	Marks	CO	BL
1.	i)	List and explain common methods of data acquisition used in machine learning	1	1	1
	ii)	Define structured and unstructured data and provide suitable examples.	1	1	1
	iii)	How is hypothesis testing applied to validate statistical assumptions?	1	2	2
	iv)	What do we mean by the term correlation in data analysis?	1	2	2
	v)	In a decision tree, how do you choose which feature to split on at each node?	1	3	2
	vi)	How does random forest deal with multicollinearity between features?	1	3	2
	vii)	In neural networks, which algorithm computes error gradients from output to input layers?	1	4	2
	viii)	What trick enables SVMs to operate in high-dimensional feature spaces without explicit mapping?	1	4	2
	ix)	What is the main objective of clustering in unsupervised learning?	1	5	1
	x)	What is the key difference between hard and soft clustering?	1	5	1
2(A)	(i)	Describe the Bias-Variance trade-off with an example.	6	1	3
	(ii)	A model gives training accuracy of 95% and test accuracy of 70%. Calculate bias and variance and interpret the result.	6	1	3
		OR			
2(B)		Illustrate the architecture of a machine learning pipeline, demonstrate the key stages involved, and apply real-world examples to each stage.	12	1	3
3(A)		For the following vectors, x and y, calculate the indicated similarity or distance measures. (a) x: (1, 1, 1, 1), y: (2,2,2,2) cosine, correlation, Euclidean (b) x: (0, 1,0, 1), y: (1,0, 1,0) cosine, correlation, Euclidean, Jaccard (c) x: (0, -1,0, 1), y: (1,0, -1,0) cosine, correlation, Euclidean (d) x: (1, 1,0, 1,0, 1), y: (1, 1, 1,0,0, 1) cosine, correlation, Jaccard (e) x: (2, -7,0,2,0, -3), y: (-1, 1, -1,0,0, -1) cosine, correlation	12	2	3
		OR			
3(B)		Nine fourth-grade students were randomly assigned to three groups to experiment with three different methods of teaching arithmetic. At the end of the semester, the same test was given to all 9 students. The table gives the scores of students in the three groups. Calculate the value of the test statistic F. Assume that all the required assumptions hold true.	12	2	3

Group-I Black board	Group-II Case presentation	Group-III PPT
4	3	2
3	4	3
2	6	3

4(A)		Using the provided Bayesian network, determine whether the variables SAT and Difficulty are conditionally independent given the variable Grade. Apply the concept of class conditional independence and justify your answer based on the structure of the network and the flow of dependencies.	12	3	3



OR

Obtain the Decision Tree using Gini Index

price	maintenance	capacity	airbag	profitable
low	low	2	no	yes
low	med	4	yes	yes
low	low	4	no	yes
low	med	4	no	no
low	high	4	no	no
med	med	4	no	no
med	med	4	yes	yes
med	high	2	yes	no
med	high	5	no	yes
high	med	4	yes	yes
high	med	2	yes	yes
high	high	2	yes	no
high	high	5	yes	yes

4(B)			12	3	3
5(A)	(i)	Explain Linear Discriminant Analysis and its uses.	6	4	2
	(ii)	How does a support vector machine (SVM) classify data?	6	4	2
		OR			
5(B)		Explain how logistic regression models the probability of a binary outcome. Interpret the role of the sigmoid (logistic) function in converting linear outputs into probabilities.	12	4	2
6(A)		Apply K-Means clustering algorithm to the following dataset: Data points: A1 = (2, 10), A2 = (2, 5), A3 = (8, 4), A4 = (5, 8), A5 = (7, 5), A6 = (6, 4), A7 = (1, 2), A8 = (4, 9). Use the following initial cluster centers: A1=(2,10), A4=(5,8), and A7=(1,2)	12	5	3
		OR			
6(B)		Apply Complete-Linkage hierarchical clustering methods to the given similarity matrix.	12	5	3

	P1	P2	P3	P4	P5
P1	1.00	0.70	0.65	0.40	0.2(
P2	0.70	1.00	0.95	0.70	0.5(
P3	0.65	0.95	1.00	0.75	0.5
P4	0.40	0.70	0.75	1.00	0.8(
P5	0.20	0.50	0.55	0.80	1.0(

END

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

Question Paper Code: 23CAI106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(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

S.No.		Question	Marks	CO	BL
1.	i)	What are tokens in Java?	1	1	1
	ii)	Define command line arguments in Java.	1	1	1
	iii)	Explain recursive methods with a simple example.	1	2	2
	iv)	What is the use of this keyword in Java?	1	2	1
	v)	Differentiate between one-dimensional and multi-dimensional arrays.	1	3	2
	vi)	What is the function of the super keyword?	1	3	1
	vii)	Define Exception in Java	1	4	1
	viii)	List any two built-in exceptions in Java.	1	4	1
	ix)	Mention any two methods of the String class.	1	5	1
	x)	What is the purpose of the Thread.sleep() method?	1	5	1
2(A)	(i)	Explain the differences between if-else, switch-case with suitable examples for each.	6	1	2
	(ii)	Explain about the ternary operators in Java with example programs	6	1	2
		OR			
2(B)		Explain the basic principles of Object-Oriented Programming (OOP) with examples.	12	1	2
3(A)	(i)	Illustrate Passing Arguments by Value and by Reference with suitable program an example.	6	2	3
	(ii)	Apply the concept of Inheritance to implement multilevel inheritance.	6	2	3
		OR			
3(B)		Demonstrate the static keyword usage with variables, methods and blocks with suitable examples	12	2	3
4(A)	(i)	Implement a Java program that defines an interface and has multiple classes	6	3	4
	(ii)	Explain how polymorphism works with suitable example	6	3	2
		OR			
4(B)		Write a Java program that uses the super keyword to call the parent class constructor and methods.	12	3	3
5(A)		Illustrate the concept of file handling streams in Java for reading and writing files with suitable program	12	4	4
		OR			
5(B)		Outline the concept of exception handling in Java by explaining its key components such as try, catch, throw, throws, and finally with suitable examples.	12	4	4

6(A)	(i)	Explain about inter-thread communication with suitable program as an example	6	5	2
	(ii)	Describe Main Thread-Creation of New Threads with example program.	6	5	2
		OR			
6(B)		Explain about the use of various String handling methods in Java to manipulate and modify strings with suitable examples.	12	5	2

*****END*****

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

QP Code: 23CAI103/23CSD103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

DIGITAL LOGIC AND COMPUTER ORGANIZATION

(Common to CSE-AI and CSE-DS)

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.	Perform $(11011010)_2$ - $(01100100)_2$ in 2's complement method.	1	1	2
	ii.	Sketch the logic circuit of a Half Adder.	1	1	1
	iii.	In a IEEE 754 single precision format, how many bits are allocated for sign, exponent and significand/mantissa?	1	2	1
	iv	State the differences between a Latch and Flip-flop.	1	2	1
	v.	List the steps involved in floating-point addition/subtraction.	1	3	2
	vi	Differentiate between CISC and RISC processors.	1	3	1
	vii.	Arrange ROM, RAM, Cache memory, Registers in descending order of their speed.	1	4	1
	viii.	Differentiate between Volatile and Non-volatile memory.	1	4	1
	ix.	List out the various stages in a six stage pipeline.	1	5	1
	x.	Differentiate programmed I/O and interrupt I/O.	1	5	1
2(A)	i.	Simplify the given Boolean function by using K-Map Method. $F(A,B,C,D)=\sum m(1,5,6,7,11,12,13,15)$ and draw the circuit diagram	8	1	4
	ii.	Form the Hamming Code for the data bits 10101101 using Even Parity.	4	1	3
		OR			
2(B)	i.	Design 8-line to 3-line encoder with suitable logic gates.	4	1	3
	ii.	Using Quine McCluskey method find the minimized Boolean expression for $F(w,x,y,z) = \Sigma m(0,1,2,3,5,7,8,10,12,13,15)$.	8		4
3(A)	i.	Explain the operation of a JK flip-flop. Also tabulate the characteristic and excitation table of a JK flip-flop.	9	2	2
	ii.	Compare sequential circuits with combinational circuits	3	2	2
		OR			
3(B)	i.	Describe the various functional units of a basic computer system. Explain how they interact during program execution.	4	2	2
	ii.	Design a 2-bit Synchronous Counter using J-K Flip Flop.	8		4
4(A)	i.	Illustrate the Booth's Multiplication Algorithm with the help of a flowchart. Multiply $(12)_{10}$ x $(-17)_{10}$	12	3	3
		OR			
4(B)	i.	Divide $(27)_{10}$ by $(3)_{10}$ using Restoring Division algorithm.	6	3	3
	ii.	Describe the various addressing modes of x86 processors.	6		2
5(A)	i.	Briefly explain about the various classifications of semi-conductor memories.	4	4	2
	ii.	Explain in detail about the various levels in RAID.	8		2
		OR			

5(B)	i.	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=$(72C786)_{16}$, A2=$(3F625B)_{16}$, A3=$(5A761B)_{16}$. Determine the sets in the cache to which these physical addresses are mapped.	6	4	4
	ii	Explain the various Cache Mapping techniques.	6	4	2
6(A)	i.	What are pipeline hazards? Explain any two types with suitable examples.	6	5	2
	ii.	Explain Flynn's classification of parallel organizations with necessary diagrams.	6	5	2
		OR			
6(B)		Discuss in detail about the various I/O Data transfer schemes with suitable diagrams.	12	5	3

*****END*****

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

Question Paper Code: 23CSD105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

INTRODUCTION TO DATA SCIENCE

(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

S.No.		Question	Marks	CO	BL
1.	i)	List any real-world applications of Data Science.	1	1	1
	ii)	What is exploratory data analysis?	1	1	1
	iii)	Define the role of Machine Learning in Data Science.	1	2	1
	iv)	List programming tips for handling large data in Python.	1	2	1
	v)	List the characteristics of NoSQL databases.	1	3	1
	vi)	How does Hadoop handle large volumes of data?	1	3	1
	vii)	What is the purpose of the Cypher query language?	1	4	1
	viii)	Give the significance of tokenization in text processing.	1	4	2
	ix)	What is the purpose of Cross filter in data visualization?	1	5	2
	x)	What is MapReduce?	1	5	1
2(A)	(i)	What are the different facets of data? Explain each with suitable examples.	6	1	2
	(ii)	Describe how findings are presented in a Data Science project.	6	1	2
		OR			
2(B)		Outline the steps involved in the data science process and explain the purpose of each step.	12	1	2
3(A)		Explain the steps involved in Data Validation and Prediction in Machine Learning models.	12	2	2
		OR			
3(B)		Discuss how Machine Learning can be used to build applications for anomaly detection with an example.	12	2	3
4(A)	(i)	Describe the architecture of the Hadoop framework.	6	3	2
	(ii)	Compare relational and NoSQL databases.	6	3	2
		OR			
4(B)		Illustrate the use of NoSQL databases with a case study on disease diagnosis and profiling.	12	3	3
5(A)	(i)	Write sample Cypher queries to create nodes and relationships in a graph database.	6	4	3
	(ii)	Describe the process of text mining. What are the key steps, and tools are used in each stage?	6	4	2
		OR			
5(B)	(i)	Discuss the key features and applications of graph databases.	6	4	2
	(ii)	Apply Neo4j to model and analyze a friendship network. Include a diagram and brief Cypher queries.	6	4	3
6(A)		Explain different types of data visualization options and their applications.	12	5	2
		OR			
6(B)		Develop a simple interactive dashboard using dc.js and explain the steps involved.	12	5	6

*****END*****

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

Question Paper Code: 23CSD106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

DATA ENGINEERING

(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

S.No.		Question	Marks	CO	BL
1.	i)	What is Data Engineering?	1	1	1
	ii)	Outline the main focus of a Data Engineer compared to a Data Scientist.	1	1	2
	iii)	Interpret the data management involve in the Data Engineering Life Cycle.	1	2	2
	iv)	Name one example of a source system in Data Engineering.	1	2	1
	v)	List two examples of unstructured data.	1	3	1
	vi)	Extend the role of application databases in data generation?	1	3	2
	vii)	Define Data Lake.	1	4	1
	viii)	Infer Batch Ingestion.	1	4	2
	ix)	Define Materialised View.	1	5	1
	x)	Outline the role of a Query Optimizer.	1	5	2
2(A)	(i)	Outline the key skills required for a Data Engineer and how they help in managing large-scale data systems.	6	1	2
	(ii)	Compare Data Engineering and Data Science with real-world examples.	6	1	2
		OR			
2(B)		Explain how Data Engineering plays a crucial role in enabling efficient data pipelines and modern data architectures.	12	1	2
3(A)	(i)	Identify and define the five key stages of the Data Engineering Life Cycle.	6	2	2
	(ii)	Compare the Data Life Cycle and the Data Engineering Life Cycle. Why is this distinction important?	6	2	2
		OR			
3(B)		Summarize the significance of data architecture in Data Engineering and its impact on performance and scalability	12	2	2
4(A)	(i)	Interpret the role of APIs and files in unstructured data generation.	6	3	3
	(ii)	Apply the CRUD operations to influence data generation in source systems.	6	3	3
		OR			
4(B)		Make use of various sources of data in source systems for handle data ingestion and explain how differently when working with structured sources like databases and unstructured sources.	12	3	3
5(A)	(i)	Compare and contrast different data ingestion frameworks (e.g., Apache NiFi, Kafka, Sqoop). In what scenarios is each best suited.	6	4	2
	(ii)	Explain the different types of data storage systems used in data engineering.	6	4	2
		OR			

5(B)	Interpret some common ways to ingest data into a data system in detail and elucidate with clear examples	12	4	2
6(A)	Analyze the data modeling for streaming data differ from traditional data modeling, justify with proper examples.	12	5	4
	OR			
6(B)	Compare and Contrast batch data transformation and streaming transformation. Highlight their benefits, use cases, and limitations with examples.	12	5	4

*****END*****

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

Question Paper Code: 23CSC104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(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

S.No.		Question	Marks	CO	BL
1.	i)	A loop that executes at least once, even if the condition is false, is the _____ loop.	1	1	1
	ii)	The _____ statement is used to exit a loop or switch statement immediately.	1	1	1
	iii)	What is the main difference between a constructor and a method?	1	2	2
	iv)	To sort an array of elements, we use Arrays.sort() method. Is sort() a static method or an instance method?	1	2	2
	v)	What is the use of the final keyword in Java?	1	3	2
	vi)	Name the access specifier that is used to access methods and classes outside the package.	1	3	1
	vii)	Name any two built-in exceptions in Java.	1	4	1
	viii)	Name the ByteStream class used to read data from a file.	1	4	1
	ix)	Which class is used to create a window in Swing?	1	5	1
	x)	Which component gives a drop-down list of options from which one can choose?	1	5	1
2(A)	(i)	Describe how to take user input in Java using the Scanner class.	6	1	2
	(ii)	Write a Java program to accept two numbers from the user and display their sum.	6	1	3
		OR			
2(B)		Write notes on data types in Java. Write a Java program that displays the default values of all the primitive data types.	12	1	3
3(A)	(i)	What is constructor overloading? Explain constructor overloading with an example.	6	2	3
	(ii)	Write a Java program to find the factorial of a number using recursion. How to deal with bigger integers in Java?	6	2	4
		OR			
3(B)		Create a class Employee with the following member variables. int employeeId String employeeName double salary double netSalary Include appropriate getters and setters method in the Employee class. Write the following method in the Employee class: public void calculateNetSalary(int pfpercentage) - This method should take the PF percentage as an argument. Deduct the PF amount from the salary and set the net salary. Create a Main class that has the main method, which invokes the method to get the input and prints the details.	12	2	4
4(A)	(i)	Write a Java program to perform matrix addition.	6	3	3
	(ii)	Write a program to explain the usage of the super keyword.	6	3	3
		OR			

4(B)		Create an interface Shape with methods area() and perimeter(). Implement this interface in two classes, Circle and Rectangle. Write a program to demonstrate polymorphism using this interface.	12	3	4
5(A)	(i)	Write a Java program to copy the contents of one file into another using byte stream classes.	6	4	3
	(ii)	Describe multiple catch clauses with a suitable example.	6	4	2
		OR			
5(B)		Explain the string methods through code snippets that are used for: (a) Extracting characters from a string, (b) comparing two strings, and (c) searching a string.	12	4	4
6(A)	(i)	Explain the life cycle (states) of a thread with a diagram.	6	5	2
	(ii)	How is a new thread created in Java? Write a simple program using the Thread class.	6	5	3
		OR			
6(B)		Describe various components of a Swing GUI application. Design a Swing form that accepts user input using text fields, radio buttons, and combo boxes.	12	5	4

*****END*****

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

Question Paper Code: 23CSC105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

OPERATING 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

S.No.		Question	Marks	CO	BL
1.	i)	What is the primary function of an operating system?	1	1	1
	ii)	Why error detection is considered a critical OS service?	1	1	1
	iii)	List any 4 differences between program and process.	1	2	1
	iv)	Name the three types of CPU schedulers.	1	2	1
	v)	How does a semaphore prevent race conditions?	1	3	1
	vi)	What are the necessary conditions for a deadlock to occur?	1	3	1
	vii)	Define compaction in memory management.	1	4	1
	viii)	What is demand paging?	1	4	1
	ix)	What are the three main file allocation methods?	1	5	1
	x)	What is disk reliability in the context of disk management?	1	5	1
2(A)	(i)	Explain layered architecture for an operating system.	6	1	3
	(ii)	Illustrate the use of shell commands in UNIX for file manipulation and user management	6	1	3
		OR			
2(B)		Analyze the advantages and limitations of the microkernel architecture compared to monolithic and layered structures.	12	1	4
3(A)	(i)	Explain the various states of a thread.	6	2	3
	(ii)	Illustrate the steps involved in context switching and explain how the Process Control Block (PCB) plays a role during this transition.	6	2	3
		OR			
3(B)		Calculate the average waiting time for the below processes using Round Robin CPU scheduling algorithm. (Time quantum=2 ms) Process ID / Arrival Time / Burst Time P1 / 0 / 5 P2 / 1 / 6 P3 / 2 / 3 P4 / 3 / 1 P5 / 4 / 5	12	2	4
4(A)	(i)	Propose a solution for the Readers-Writers problem using message passing.	6	3	3
	(ii)	Illustrate the solution with a sequence diagram showing how readers and writers coordinate access to a shared resource.	6	3	3
		OR			
4(B)		Analyze a deadlock-prone system with four processes and four resources. Show how deadlock can be detected using a resource allocation graph and propose a recovery strategy to resolve the deadlock.	12	3	4
5(A)	(i)	Develop an example to explain demand paging.	6	4	3
	(ii)	Discuss how demand paging improves memory utilization.	6	4	3
		OR			

5(B)		Consider page reference string 1, 3, 0, 3, 5, 6, 3 with 3-page frames. Find the page fault ratio using FIFO Page Replacement Algorithm.	12	4	4
6(A)	(i)	Illustrate how protection rings are used in operating systems to maintain security.	6	5	3
	(ii)	Explain how a security violation is prevented using protection rings.	6	5	3
		OR			
6(B)		Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 37, 122, 14, 124, 65, 67. The head is initially at cylinder number 53, moving towards a larger number of cylinders. Find out the total number of head movements using SCAN (Elevator) disk scheduling algorithm..	12	5	2

*****END*****

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

Question Paper Code: 23CSC106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

COMPUTER NETWORKS

(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

S.No.		Question	Marks	CO	BL
1.	i)	What is a computer network?	1	1	1
	ii)	Name two types of transmission media used in computer networks.	1	1	1
	iii)	Which protocol is used for error detection in Ethernet?	1	2	1
	iv)	What is the purpose of flow control mechanisms?	1	2	1
	v)	What is the primary function of the Network Layer in the OSI model?	1	3	1
	vi)	Explain NAT and its purpose.	1	3	2
	vii)	What does TCP ensure in communication?	1	4	1
	viii)	Outline the primary difference between TCP and UDP	1	4	2
	ix)	What is the main function of the Application Layer in the OSI model?	1	5	1
	x)	What does MIME stand for, and what is its purpose?	1	5	1
2(A)		Categorize various layers of OSI reference model in detail.	12	1	4
		OR			
2(B)		Compare and contrast different types of computer networks: PAN, LAN, MAN, WAN, and internetworks.	12	1	3
3(A)		Discuss error detection techniques like CRC, checksum, and parity. How do they work?	12	2	2
		OR			
3(B)		Evaluate the flow control mechanisms, and why are they necessary? Explain Stop-and-Wait and Sliding Window protocols.	12	2	4
4(A)		Analyze the primary functions and design issues of the Network Layer.	12	3	3
		OR			
4(B)		Distinguish between IPv4 and IPv6 in detail.	12	3	3
5(A)		Explain the functions of the Transport Layer in the OSI model.	12	4	2
		OR			
5(B)		Evaluate the process of TCP connection establishment through the three-way handshake with suitable example.	12	4	3
6(A)		Inspect SNMP, and how does it manage network devices?	12	5	3
		OR			
6(B)		Demonstrate how HTTP works and its role in web browsing.	12	5	3

END

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

Question Paper Code: 23CSM105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

PRINCIPLES OF ARTIFICIAL INTELLIGENCE

(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

S.No.		Question	Marks	CO	BL
1.	i)	Define Artificial Intelligence.	1	1	1
	ii)	Differentiate between a rational agent and an intelligent agent.	1	1	1
	iii)	Define uninformed search.	1	2	1
	iv)	Differentiate between BFS and DFS.	1	2	1
	v)	What is a frame?	1	3	1
	vi)	Write the purpose of a rule-based deduction system.	1	3	1
	vii)	How is FOL different from propositional logic?	1	4	1
	viii)	Define inductive learning.	1	4	1
	ix)	What is an expert system?	1	5	1
	x)	Define meta-knowledge in the context of expert systems.	1	5	1
2(A)		Illustrate in detail about the role of various types of environments in AI with examples.	12	1	3
		OR			
2(B)		Describe the general structure of a problem-solving agent and the steps it follows to reach a solution.	12	1	2
3(A)	(i)	How Alpha-Beta pruning improves the efficiency of the minimax algorithm? Illustrate.	6	2	3
	(ii)	Explain the working of A* search algorithm with an example.	6	2	2
		OR			
3(B)		Discuss the problems encountered in game playing AI such as combinatorial explosion and real-time decision-making.	12	2	2
4(A)	(i)	How reasoning under uncertainty is handled using Bayesian probabilistic inference? Illustrate	6	3	3
	(ii)	Explain predicate logic in detail.	6	3	2
		OR			
4(B)		How is constraint propagation used in problem solving? Illustrate with an example (e.g., Sudoku)	12	3	3
5(A)	(i)	Describe the process of learning a decision tree.	6	4	2
	(ii)	How forward chaining and backward chaining work? Explain	6	4	3
		OR			
5(B)		Describe the steps involved in statistical learning method, Naive Bayes advantages and limitations.	12	4	2
6(A)	(i)	Discuss the architecture of an expert system in detail.	6	5	2
	(ii)	How expert systems are developed using expert system shells? Illustrate	6	5	3
		OR			
6(B)		Illustrate a detailed overview of MYCIN. What domain did it serve, and how did it use rules?	12	5	3

*****END*****

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

Question Paper Code: 23CSM104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

MACHINE LEARNING

(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

S.No.		Question	Marks	CO	BL
1.	i)	What is reinforcement learning?	1	1	1
	ii)	Mention one example of structured data.	1	1	1
	iii)	List any two non-metric similarity functions	1	2	2
	iv)	What is the purpose of proximity measures in machine learning?	1	2	1
	v)	Name one impurity measure used in decision trees.	1	3	1
	vi)	Which probability theorem is the foundation of the Naïve Bayes classifier?	1	3	1
	vii)	Name a commonly used kernel in non-linear SVMs.	1	4	1
	viii)	What type of neural network has multiple layers between input and output?	1	4	1
	ix)	How does Rough K-Means differ from classical K-Means?	1	5	2
	x)	What type of clustering allows a data point to belong to more than one cluster?	1	5	1
2(A)	(i)	Write learning by rote and learning by induction with examples.	6	1	4
	(ii)	Explain the Evolution of Machine Learning.	6	1	3
		OR			
2(B)		**Scenario:** An employee is working on a fraud detection system for an e-commerce company. The model predicts whether a transaction is "Fraud" or "Non-Fraud." After running the model on a test dataset, the employee observed the following performance results: 1. The model flagged 110 transactions as "Fraud," but 30 of these were actually "Non-Fraud." 2. Out of 100 true fraud cases, the model identified 80 correctly. 3. There are a total of 200 transactions in the test dataset. **Question:** Analyze the above scenario and draw a confusion matrix. Then, compute the True Positive Rate, True Negative Rate, False Positive Rate, False Negative Rate.	12	1	2
3(A)	(i)	Demonstrate the k-nearest neighbor classification algorithm with an example.	6	2	3
	(ii)	Given data,	6	2	4

Feature 1	Feature 2	Class
2.87	2.06	A
5.75	4.91	A
4.66	4.50	B
3.99	2.64	B
1.78	2.55	B
4.01	3.30	B

Measure the performance of the k-nearest neighborclassification algorithm using Euclidean distance with different K values, such as 2, and 3. Compare the performance of different K values.

Note: Consider that the first 66.6% of the samples are used for training the model, and the remaining 33.3% of the samples are used for testing the model.

OR

3(B)		Demonstrate the radius distance nearest neighbor algorithm with an example.	12	2	3

4(A)	(i)	Given Data, **Color** | **Size** | **Target** Red | Small | Yes Blue | Medium | No Green | Large | Yes Blue | Small | No Red | Large | Yes Green | Medium | No Red | Medium | Yes Blue | Large | No Evaluate the data using a decision tree classification algorithm using the ID3 method. Predict which feature can act as the root node in the decision tree. Then, draw a decision tree.	6	3	4
	(ii)	Analyze the structure and functioning of the Decision Tree algorithm using ID3, and compare its strengths and weaknesses with other classification algorithms.	6	3	2
		OR			
4(B)		Analyze how the Naïve Bayes classifier works by breaking down its assumptions and comparing its performance with other classification algorithms using a practical example.	12	3	3

5(A)	(i)	Explain the Backpropagation for Training an MLP.	6	4	4
	(ii)	Analyze how Linear Discriminant Analysis (LDA) works for classification. Break down the key steps involved in LDA, including the calculation of class means, scatter matrices, and the final decision rule.	6	4	3
		OR			
5(B)		Illustrate a support vector machine classifier with an example	12	4	2

6(A)		Given data, **Point** | **x-coordinate** | **y-coordinate** P1 | 1 | 3 P2 | 5 | 2 P3 | 2 | 7 P4 | 6 | 6 Evaluate the data using agglomerative clustering. Predict the resulting clusters. Finally, represent the resulting clusters using a graph. **Note:** Use Euclidean distance measure and single linkage. Stop when the number of clusters is 2.	12	5	3
		OR			
6(B)		Compare the Fuzzy C-Means algorithm with K-Means in terms of algorithmic steps, membership functions, and suitability for overlapping data.	12	5	4

*****END*****

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

Q P Code: 23CSM106 & 23CSN106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

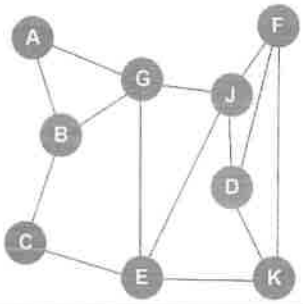
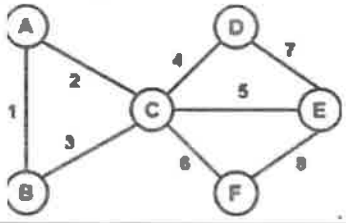
B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

ADVANCED DATA STRUCTURES AND ALGORITHMS ANALYSIS

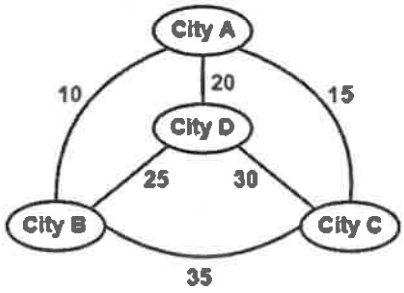
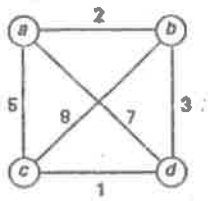
(Common to CSE-AI&ML and CSE-Networks)

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

S.No.		Question	Marks	CO	BL
1.	i)	Define Pseudocode	1	1	1
	ii)	What is overflow condition in B-Trees	1	1	1
	iii)	Define Divide and Conquer	1	2	1
	iv)	List the applications of Greedy Method	1	2	1
	v)	Mention the drawback of Bellman Ford algorithm	1	3	1
	vi)	Mention the steps involved in dynamic programming	1	3	1
	vii)	Define explicit constraints	1	4	1
	viii)	Define live node	1	4	1
	ix)	Define NP-complete problem	1	5	1
	x)	Define deterministic algorithm	1	5	1
2(A)	(i)	Design an iterative algorithm for finding a Fibonacci series	6	1	3
	(ii)	Analyze and calculate the space complexity and time complexity for the above algorithm.	6	1	4
		OR			
2(B)	(i)	Illustrate the algorithm of Depth First Search.	4	1	2
	(ii)	Analyse and solve the following problem using Depth First Search (DFS). 	8	1	4
3(A)	(i)	Analyse the quick sort algorithm by outlining its procedure	6	2	4
	(ii)	Apply quick sort algorithm on the following sequence of keys to arrange in ascending order 33,66,11,55,67,78,24,35,88,99	6	2	3
		OR			
3(B)		Illustrate Krushkal's algorithm and Apply Krushkal's algorithm and find minimum spanning tree 	12	2	3
4(A)	(i)	Apply dynamic programming and obtain an optimal solution to 0/1 knapsack problem with n=3, (W1, W2, W3) = (2, 3, 4), (P1, P2, P3) = (1, 2, 5) and M = 6.	8	3	3
	(ii)	Compare dynamic programming with greedy method.	4	3	4

OR

4(B)		Apply dynamic programming and find the travelling salesman optimal tour for the below graph: 	12	3	3
5(A)	(i)	Give the statement of sum of subsets problem. Apply backtracking and find all sum of subsets for n=4, s={11,13,24,7} and Sum=31.	7	4	3
	(ii)	Analyse and sketch the portion of the state space tree for the above	5	4	4
		OR			
5(B)		Apply Branch and Bound algorithm for the Travelling Salesman Problem given below. 	12	4	4
6(A)	(i)	Explain in details about Class NP-Hard problem.	6	5	2
	(ii)	Differentiate between NP-Hard & NP-Complete algorithms	6	5	2
		OR			
6(B)		Illustrate the Clique Decision Problem with an example graph	12	5	2

*****END*****

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

Question Paper Code: 23CSN104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

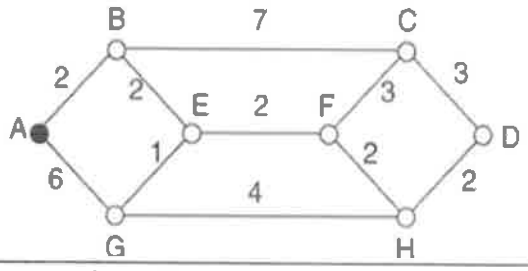
B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

DATA COMMUNICATIONS AND COMPUTER NETWORKS

(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

S.No.		Question	Marks	CO	BL
1.	i)	Name the layers in the OSI model.	1	1	2
	ii)	What is the use of switching in networks?	1	1	1
	iii)	What is the purpose of the OSI model?	1	2	1
	iv)	What is Hamming code?	1	2	1
	v)	Mention any two types of MAC protocols.	1	3	2
	vi)	What is NAT?	1	3	1
	vii)	What is IPv6?	1	4	2
	viii)	What is SCTP used for?	1	4	1
	ix)	Name any two application layer protocols.	1	5	1
	x)	What is the use of DNS?	1	5	2
2(A)	(i)	Describe the architecture and functioning of the ISDN physical layer.	6	1	3
	(ii)	Write short notes on ATM and Frame Relay networks.	6	1	2
		OR			
2(B)		Compare simplex, half-duplex, and full-duplex communication with suitable examples.	12	1	4
3(A)	(i)	Differentiate between hubs, switches, bridges, and routers as connecting devices.	6	2	3
	(ii)	Describe Hamming Code for error detection and correction. Encode and decode a sample data word.	6	2	3
		OR			
3(B)		Describe the framing methods in the Data Link Layer and compare character count vs. byte stuffing.	12	2	3
4(A)	(i)	Describe routing in ad-hoc networks and the challenges involved.	6	3	3
	(ii)	Explain the concept of Network Address Translation (NAT) with a diagram.	6	3	3
		OR			
4(B)		For the network graph given below, compute the shortest path from node A to all other nodes using Dijkstra's algorithm:  	12	3	4
5(A)	(i)	Describe how network performance is measured and the parameters involved.	6	4	3
	(ii)	Discuss the basic services provided by the transport layer.	6	4	4
		OR			

5(B)		Develop a performance comparison of TCP and UDP for a Audio streaming application. Include latency, throughput, and packet loss.	12	4	4
6(A)	(i)	Describe client-server programming and its importance in computer networks.	6	5	4
	(ii)	Compare the working of FTP and TELNET protocols.	6	5	3
		OR			
6(B)		Trace the DNS resolution process when a user enters 'www.example.com' into a browser. Include all the steps and involved servers.	12	5	4

*****END*****

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

Question Paper Code: 23CSN105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

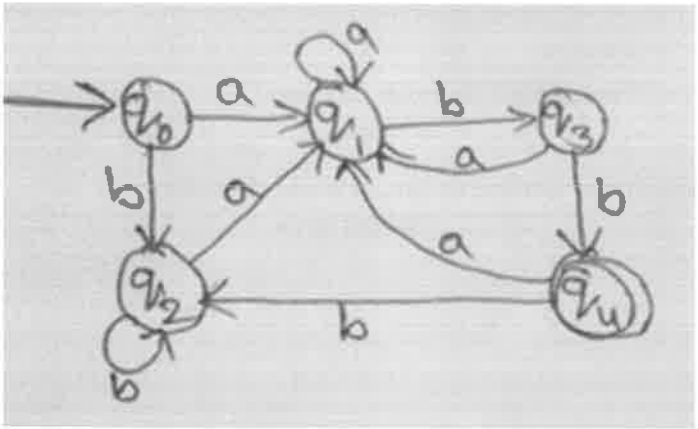
B. Tech II Year II Semester (R23) Regular End Semester Examinations, June – 2025

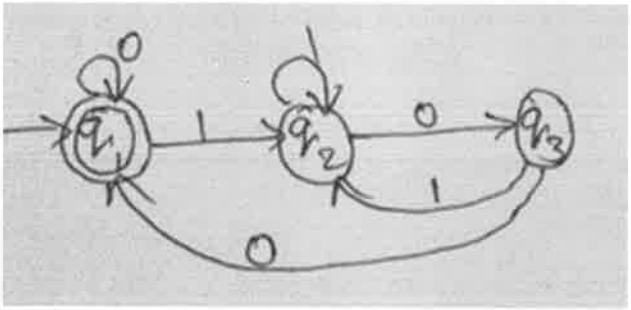
AUTOMATA THEORY AND COMPILER DESIGN

(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

S.No.		Question	Marks	CO	BL
1.	i)	Define a formal language with an example.	1	1	1
	ii)	Distinguish between DFA and NFA.	1	1	1
	iii)	Define significance of the Chomsky hierarchy?	1	2	1
	iv)	State pumping lemma for regular languages.	1	2	1
	v)	Define Pushdown Automata.	1	3	1
	vi)	Describe the meaning of a configuration in a Pushdown Automaton (PDA).	1	3	1
	vii)	Express token in compiler design.	1	4	1
	viii)	List any two phases of a compiler.	1	4	1
	ix)	State the purpose of code generation.	1	5	1
	x)	Define a basic block.	1	5	1
2(A)	(i)	Explain the Chomsky Hierarchy of languages with examples for each type.	6	1	4
	(ii)	Construct a DFA that accepts all strings over {0,1} that end with '01'.	6	1	2
		OR			
2(B)		Minimize the given DFA using the Equivalence Method and draw the minimized DFA. 	12	1	3
3(A)	(i)	Show that the below grammar is ambiguous by providing two distinct parse trees for the string id + id * id. $E \rightarrow E + E$ $E \rightarrow E * E$ $E \rightarrow (E)$ $E \rightarrow id$	6	2	3
	(ii)	Differentiate between regular languages and context-free languages with examples.	6	2	3
		OR			

3(B)		Apply Arden's method, Convert the given DFA to Regular Expression. 	12	2	4
4(A)	(i)	Design a TM for the language L={wwR|w∈(a+b)*}.	6	3	3
	(ii)	Construct PDA for the grammar S->aSb|A A->bSa|S|€ That accept L by empty stack.	6	3	3
		OR			
4(B)	(i)	Explain programming techniques used in Turing Machines with examples.	12	3	2
5(A)	(i)	Compare top-down and bottom-up parsing.	6	4	2
	(ii)	explain any three phases of a compiler with reference to the following statement: Total = price * quantity + tax	6	4	2
		OR			
5(B)		Construct LR(0) parse table and check whether the given grammar is LR(0) or not? E->E+T | T T -> T*F | F F -> (E) | id	12	4	3
6(A)	(i)	Explain the different types of intermediate representations used in compilers with examples.	6	5	2
	(ii)	Explain DAG representation of basic blocks.	6	5	4
		OR			
6(B)		Explain the concept of Optimization of Basic Blocks.	12	5	2

END