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

Question Paper Code: 23HUM102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May – 2026

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 do you classify Economics?	1	1	1
	ii)	What are the exceptions for the law of demand?	1	1	1
	iii)	Outline production function.	1	2	1
	iv)	Illustrate the production factors.	1	2	1
	v)	Define a Market.	1	3	1
	vi)	Illustrate the features of monopolistic competition.	1	3	1
	vii)	What is Accounting?	1	4	1
	viii)	Construct the proforma for a journal in accounting.	1	4	1
	ix)	What is a current ratio?	1	5	1
	x)	Outline capital budgeting techniques.	1	5	1
2(A)		Explain the nature and scope of economics with an example.	12	1	2
		OR			
2(B)		What do you understand by the law of demand? Elaborate the assumptions of demand and factors influencing it.	12	1	2
3(A)		What is meant by production? Examine production function in the short run.	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)		Distinguish between perfect and monopolistic competition with examples.	12	3	2
		OR			
4(B)		Explain the features of a monopoly market and explain the price-output determination under it.	12	3	2
5(A)		Explain the advantages and disadvantages of accounting.	12	4	2
		OR			
5(B)		Construct trading a/c, profit & loss a/c and balance sheet for the year ended 31-6-2025	12	4	4

Particulars	Rs Dr	Rs. Cr
Capital		40000
Bank	4000	
Machinery	6000	
Creditors		8000
Purchases	5000	
Purchase returns		1000

Sales		10000
Sales returns	1000	
Rent	2000	
Wages	4000	
Salary	5000	
Discount	3000	
Office expenses	10000	
Debtors	12000	
Bills receivables	7000	
	59000	59000
Adjustments 1. Closing stock Rs. 8000 2. Outstanding salary Rs. 1000 3. Prepaid rent Rs. 500 4. Depreciation 10% on machinery		

6(A)	Explain different types of ratios and its methods of calculation.	12	5	2
	OR			
6(B)	Discuss capital budgeting techniques of capital investment proposals.	12	5	3

*****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 & Supplementary End Semester Examinations, May 2026

Engineering Hydrology

(Department of Civil Engineering)

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

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 hydrologic cycle.	1	1	1
	ii)	What is the depth-area-duration curve?	1	1	1
	iii)	Define runoff.	1	2	1
	iv)	Define evaporation.	1	2	1
	v)	What is the flow duration curve?	1	3	1
	vi)	Define S-curve.	1	3	1
	vii)	What is rational method of flood routing?	1	4	1
	viii)	Define reservoir routing.	1	4	1
	ix)	Define well.	1	5	1
	x)	What is the dimension of the storage coefficient (S)?	1	5	1
2(A)		Explain the procedure for checking the rainfall data for consistency.	12	1	2
		OR			
2(B)		Explain the hydrologic cycle with a neat sketch and describe its components.	12	1	2
3(A)		Analysis of data on maximum one-day rainfall depth at Madras indicated that a depth of 560 mm had a return period of 100 years. Determine the probability of a one-day rainfall depth equal to or greater than 560 mm at Madras occurring (a) once in 40 successive years, (b) two times in 30 successive years, and (c) at least once in 40 successive years.	12	2	3
		OR			
3(B)		Describe a commonly used evaporimeter and the factors that effect the evaporation from a water body.	12	2	2
4(A)		The ordinates of a 6-hour UH of a catchment is given below:	12	3	4

Time (h)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
UH ordinate (m^3/s)	0	30	60	85	125	160	185	160	110	60	36	25	20	15	0

Derive the flood hydrograph in the catchment due to the storm given below:

Time from start of storm (h)	0	6	12	18
Accumulated rainfall (cm)	0	4.0	12.0	18

The storm loss rate for the catchment is estimated as 0.30 cm/h. The base flow can be assumed to be 15 m^3/s at the beginning and increasing by 2.0 m^3/s for every 12 hours till the end of the direct-runoff hydrograph.

OR

4(B)		Two storms each of 6-*h* duration and having rainfall excess values of 3.0 cm and 2.0 cm respectively occur successively. The 2-cm ER rain follows the 3-cm rain. The 6-*h* unit hydrograph for the catchement is given below. Calculate the resulting DRH.	12	3	4

Time (h)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
UH ord-inate (m^3/s)	0	30	60	85	125	160	185	160	110	60	36	25	20	15	0

5(A)	Explain: 1. Hydrologic channel routing. 2. Theoretical probability method in the context of flood-frequency analysis.	12	4	2
	OR			
5(B)	The mean annual flood of a river is 600 m^3/s and the standard deviation of the annual flood time series is 150 m^3/s. What is the probability of a flood of magnitude 1000 m^3/s occurring in the river within the next 5 years? Use Gumbel's method and assume the sample size to be very large. Given $\underline{y_N}$ =0.577 and S_N= 1.2825.	12	4	3
6(A)	A 60-cm well completely penetrates an unconfined aquifer of saturated depth 80 m. After a long period of pumping at a steady rate of 3000 lpm, the drawdown in two observation wells 50 m and 150 m from the pumping well were found to be 7.0 m and 4.0 m respectively. 1. Determine the transmittivity of the aquifer. 2. What is the drawdown at the pumping well?	12	5	3
	OR			
6(B)	A field test for permeability consists in observing the time required for a tracer to travel between two observation wells. A tracer was found to take 5 h to travel between two wells 25 m apart when the difference in the water-surface elevation in them was 0.25 m. The mean particle size of the aquifer was 1 mm and the porosity of the medium is 0.15. If $v = 0.005\ cm^2/s$ estimate: 1. The coefficient of permeability and intrinsic permeability of the aquifer 2. The Reynold's number of the flow.	12	5	3

*****END*****

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

Question Paper Code: 23CE106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May 2026

Concrete Technology

(Department of Civil Engineering)

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

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 grade of cement? List any three grades of cement	1	1	1
	ii)	What are the Physical Quality requirements of aggregates?	1	1	1
	iii)	Define Workability.	1	2	1
	iv)	Define segregation of concrete	1	2	1
	v)	Name the three mechanical property of concrete	1	3	1
	vi)	Define modulus of elasticity of concrete	1	3	1
	vii)	What is drying shrinkage?	1	4	1
	viii)	Explain causes of creep.	1	4	1
	ix)	What is self-healing concrete	1	5	1
	x)	Which mechanical property going to enhance with addition of fiber to concrete?	1	5	1
2(A)		Explain various field tests & any two laboratory tests that are to be carried out on cement.	12	1	2
		OR			
2(B)		Explain the concepts of porosity, adsorption, and moisture content in relation to aggregates. How do these properties influence the behavior of concrete?	12	1	2
3(A)		Explain the sequence of operations in manufacturing concrete.	12	2	2
		OR			
3(B)		Demonstrate the process of curing and its significance on strength	12	2	2
4(A)	(i)	Describe types of NDT tests?	6	3	3
	(ii)	Identify how the compressive test on concrete cube is conducted.	6	3	2
		OR			
4(B)		Critically analyze the limitations of Abram's Law in predicting the long-term strength of concrete, considering factors such as cement type and curing conditions.	12	3	4
5(A)	(i)	What are the factors affecting shrinkage of concrete?	6	4	2
	(ii)	List the types of shrinkage in concrete and explain each.	6	4	2
		OR			
5(B)		Define modulus of elasticity and explain how it is measured.	12	4	2
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)	Design a concrete mix of M20 grade using IS method with the following data. Max. Nominal size of aggregate available: 20mm Degree of workability: 0.9 compaction factor Degree of quality control : good Type of exposure : Mild Cement used : OPC 43 grade Fine aggregate: Zone III Specific gravity of Cement :3.15 Specific gravity of fine aggregate: 2.60 Specific gravity of Coarse aggregate: 2.65 *****END*****	12	5	4

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

Question Paper Code: 23CE108

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May 2026

Environmental Engineering

(Department of Civil Engineering)

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

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 per capita demand?	1	1	1
	ii)	What are the different treatment units required for treating surface water in water treatment plant?	1	1	1
	iii)	What is manhole? What is its purpose?	1	2	1
	iv)	Define COD?	1	2	1
	v)	Define Sludge Volume Index (SVI)?	1	3	1
	vi)	What is septic tank? What is its purpose?	1	3	1
	vii)	List various control equipment's used to control particulate pollutants.	1	4	1
	viii)	What are the various sources of noise pollution?	1	4	1
	ix)	What is Municipal Solid Waste?	1	5	1
	x)	Write any four effects of solid waste on environment?	1	5	1
2(A)	(i)	The population of a colony in Madanapalli from 1970 to 2010 are given below in the table. Forecast the population for 2045 using geometric rate method	6	1	4

Year	1970	1980	1990	2000	2010
Population	24831	25293	25423	27263	38284

	(ii)	Write a short note on the layout of distribution systems with neat sketches, which are commonly used in India.	6	1	3
		OR			
2(B)	(i)	What do you mean by water demand? Explain different types and fluctuations of water demands.	6	1	2
	(ii)	Design a rectangular horizontal flow sedimentation tank to purify a water for a town with a daily demand of 9 MLD. Assume the velocity of flow in the sedimentation tank as 22cm/min and the detention time as 8 hours.	6	1	4
3(A)	(i)	BOD_5 test was conducted for a raw sewage at 20^0C with a initial DO of 0 mg/lit which was diluted 100 times with distilled water carrying 9 mg/lit of oxygen. The final DO after experiment was measured as 1.2 mg/lit. Estimate the amount of BOD consumed and remaining after 12 days. Consider K_{20}= 0.18 per day.	6	2	4
	(ii)	Sketch the schematic process flow diagram of sewage treatment plant. Explain the functions of each unit.	6	2	3
		OR			
3(B)	(i)	A City of population 2.5 lakhs with per capita demand of 200lpcd releases its waste into a combined circular sewer. Rainfall occurred into the city for a duration of 8 hrs with time of concentration of 30min. Consider manning's coefficient as 0.012 and bed slope as 1 in 440, estimate the diameter of combined sewer under full flow condition.	12	2	4

		Assume runoff coefficient as 0.45 and 70% of water is converted into waste water. Take catchment area as 50 hectares.			
4(A)	(i)	A septic tank is designed to treat wastewater from gated community with a population of 300 and per capita sewage flow of 300lpcd. Consider digestion period as 24 hours and depth of settling zone as 1.5 m. If the sludge accumulation rate is 30 lit/person/year and the tank is cleared for every 2 years. Estimate the depth of sludge zone required.	12	3	4
		OR			
4(B)		A 32 MLD of raw sewage has to undergo treatment using oxidation pond with an organic loading rate of 240 kg/day/ha. Determine the dimensions of the oxidation pond to treat sewage with an influent BOD of 300 mg/lit and to achieve efficiency of 85%.	12	3	4
5(A)	(i)	What is air pollution? Explain various health impacts of air pollution on human health and on vegetation.	6	4	2
	(ii)	Explain the construction and working mechanism of cyclone separator with its advantages and limitations	6	4	2
		OR			
5(B)		Explain the various health impacts of noise pollution on human health and along with control techniques to control noise pollution.	12	4	2
6(A)	(i)	Discuss the physical and chemical parameters of municipal solid waste.	6	5	2
	(ii)	Discuss various treatment methods of MSW with suitable examples.	6	5	2
		OR			
6(B)		Discuss causes, effects, and control measures of solid waste pollution. Suggest best disposal method of MSW.	12	5	2

*****END*****

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

Question Paper Code: 23CE107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May 2026

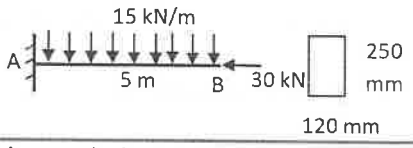
Structural Analysis

(Department of Civil Engineering)

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

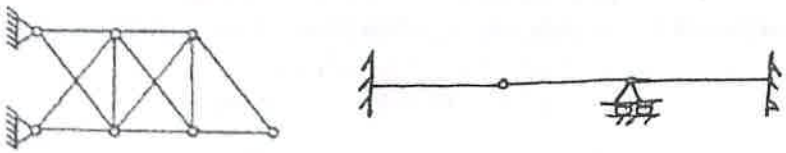
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S. No.		Question	Marks	CO	BL
1.	i)	State the meaning of strain energy in a linear elastic system.	1	1	1
	ii)	State Castigliano's First Theorem and mention its application.	1	1	2
	iii)	Explain the concept of static indeterminacy of a structure.	1	2	1
	iv)	State the correct expression for the degree of static indeterminacy of a plane truss.	1	2	2
	v)	Describe a fixed beam and mention one key advantage.	1	3	2
	vi)	What is meant by sinking of supports?	1	3	3
	vii)	State the unknowns considered in slope deflection equations.	1	4	2
	viii)	Identify the fundamental relationship used in the slope deflection method.	1	4	1
	ix)	What is a distribution factor?	1	5	1
	x)	Find the correct carry-over factor for a prismatic beam with one end fixed.	1	5	3
2(A)	(i)	Explain the application of strain energy method for determining deflection of a simply supported beam subjected to UDL throughout the length.	6	1	2
	(ii)	With necessary equations, explain the use of energy theorems for deflection analysis of structures. Mention advantages and limitations of energy methods.	6	1	2
		OR			
2(B)		A cantilever beam AB of length 5 m, having a uniform rectangular cross-section with a width of 120 mm and a depth of 250 mm, is subjected to a uniformly distributed load of 15 kN/m over its entire span. In addition, an axial compressive load of 30 kN is applied at the free end of the beam. The beam material is linearly elastic with Young's modulus $E = 2.1 \times 10^5$ MPa and shear modulus $G = 0.85 \times 10^5$ MPa. Determine the total strain energy stored in the beam, considering the contributions due to axial deformation, bending and shear deformation.	12	1	4

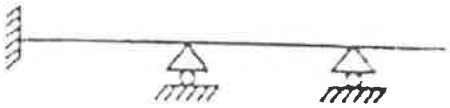


3(A)	(i)	Explain static and kinematic indeterminacy. Derive expressions for: (a) Plane trusses (b) Plane frames	6	2	3
	(ii)	Describe the unit load method for determining deflection of structures. Explain the steps involved with a neat illustrative diagram	6	2	2
		OR			

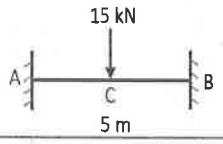
3(B)	(i) Calculate the degree of static indeterminacy for the structures below under general loading.	12	2	4



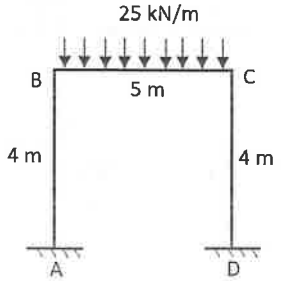
(ii) Calculate the degree of kinematic indeterminacy for the beam below, considering axial deformations and neglecting axial deformations.



4(A)	(i)	With neat sketches, explain the concept of fixed beams. Derive expressions for fixed end moments due to: (a) uniformly distributed load (b) central point load.	6	3	3
	(ii)	Explain the effect of sinking of supports on fixed beams. How does it alter bending moments and reactions?	6	3	2
		OR			
4(B)		A fixed beam AB of span $L = 5\,m$ is subjected to a concentrated load $W = 15\,kN$ acting at the midpoint C, as shown in the figure, and the beam is fixed at both ends A and B with a constant flexural rigidity $EI = 2.15 \times 10^4\,kN \cdot m^2$; determine the fixed end moments at supports A and B, calculate the maximum deflection of the beam, and draw the bending moment diagram (BMD) indicating the fixed end moments, taking sagging moment as positive and hogging moment as negative.	12	3	4



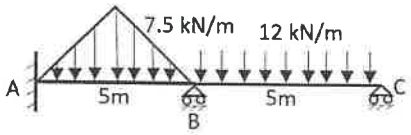
5(A)	(i)	With a neat sketch, explain the analysis of a single-bay portal frame without sway using slope deflection method.	6	4	4
	(ii)	Explain how support settlement is accounted for in slope deflection analysis. Derive the modified equations and explain their significance.	6	4	3
		OR			
5(B)		Analyse the single bay symmetrical portal frame shown in the figure, with Young's modulus E = 2.1 × 10^5 MPa and second moment of area I = 8.14 × 10^{-5} m^4, by using the slope-deflection method.	12	4	4



6(A)	(i)	Explain the analysis of continuous beams with support settlement using moment distribution method.	6	5	2
	(ii)	Compare Moment Distribution Method and Kani's Method with respect to: • Concept • Procedure • applicability.	6	5	4

OR

6(B)		Analyse the continuous beam shown in the figure, with Young's modulus E and second moment of area I, by using the moment distribution method.	12	5	4



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

Question Paper Code: 23EEE106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May 2026

Analog Circuits

(Department of Electrical & Electronics Engineering)

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

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 difference between clipping and clamping	1	1	1
	ii)	Define voltage divider bias in BJT.	1	1	1
	iii)	Define h-parameters of a transistor.	1	2	1
	iv)	What is voltage-series feedback?	1	2	1
	v)	State the Barkhausen criterion for oscillation.	1	3	1
	vi)	List the characteristics of an ideal Op-Amp.	1	3	1
	vii)	What is a sample and hold circuit?	1	4	1
	viii)	What is a Monostable multivibrator?	1	4	1
	ix)	List the basic functional blocks of a 555 timer.	1	5	1
	x)	What is an R-2R ladder DAC?	1	5	1
2(A)	(i)	Illustrate the operation of clipping at two independent levels	6	1	4
	(ii)	Draw the transfer characteristics of clippers and explain	6	1	3
		OR			
2(B)	(i)	Draw the collector to base bias circuit and derive an expression for the stability factor.	8	1	3
	(ii)	Why self-bias is more stable compared with other biasing methods	4	1	2
3(A)	(i)	A CB transistor amplifier is driven by a voltage source V_S having internal resistance of 800 Ω. The load impedance is 2000 Ω. The h parameters are: $h_{ib} = 22\ \Omega$, $h_{rb} = 3 \times 10^{-4}$, $h_{fb} = -0.98$ and $h_{ob} = 0.5\ \mu A/V$. Compute the current gain, voltage gain, input impedance, output impedance and operating power gain. Also with neat circuit diagram, derive all the expressions used.	12	2	4
		OR			
3(B)		Illustrate the concept of Feedback amplifier with block diagram and general structure.	12	2	4
4(A)	(i)	Explain the working principle of Wein-bridge oscillator using BJT and Derive the expression for frequency of sustained oscillations.	6	3	2
	(ii)	In a Wien bridge oscillator, if the value of R is 100 kΩ and frequency of oscillation is 10kHz, examine the value of capacitor C.	6	3	3
		OR			
4(B)	(i)	Explain about block diagram of typical Op-amp in detail.	6	3	2
	(ii)	Explain DC characteristics of op-amp.	6	3	2
5(A)		Illustrate about Instrumentation amplifier with neat circuit diagram.	12	4	4
		OR			
5(B)	(i)	Explain the operation of differentiator circuit with sine wave input using op-amp.	6	4	2
	(ii)	List the different types of comparators and draw the transfer characteristics of ideal and practical comparator	6	4	2

6(A)	(i)	Draw a neat circuit of Astable Multivibrator using 555 IC and explain operation with waveforms.	6	5	3
	(ii)	In the Astable Multivibrator, RA =2.2kΩ, RB=3.9kΩ and C=0.1μF. Determine the positive pulse width tc, negative pulse width td and free-running frequency fo.	6	5	3
		OR			
6(B)		Draw the circuit diagram of Dual Slope ADC and explain its working with neat sketches.	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 & Supplementary End Semester Examinations, May 2026

Power Systems I

(Department of Electrical & Electronics Engineering)

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

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 function of surge tank in hydro-electric power station?	1	1	1
	ii)	What is the function of coolant in nuclear reactor?	1	1	1
	iii)	Define efficiency of transmission.	1	2	1
	iv)	What do you mean by GMD in transmission line?	1	2	1
	v)	What is the advantage of underground substation?	1	3	1
	vi)	What are the main advantages of a gas insulated substation over the air insulated substation?	1	3	1
	vii)	What is the difference between radial distribution and ring main?	1	4	1
	viii)	How are the distribution systems classified?	1	4	1
	ix)	Differentiate between base load plants and peak load plants.	1	5	1
	x)	What is a three-part tariff?	1	5	1
2(A)		Draw the schematic diagram of a hydroelectric power plant and explain the function of each component.	12	1	2
		OR			
2(B)		The annual load duration curve of a power station is a straight line from 20MW to 4MW. To meet this load three generating units, two of 10MW each and another unit of 5MW are installed. Determine the i) installed capacity of the plant ii) plant capacity factor iii) units generated per annum iv) plant load factor v) plant utilization factor.	12	1	3
3(A)		Draw the nominal T model of medium transmission line, develop its phasor diagram and derive the formula for sending end voltage and current.	12	2	2
		OR			
3(B)		Calculate the inductance of each conductor in a 3 phase 3 wire line placed in a horizontal plane with spacing D31 = 4m, D12 = D23 = 2m and each conductor has a diameter of 2.5Cm.	12	2	3
4(A)		Differentiate between the functioning of Air Insulated and Gas Insulated Substations.	12	3	2
		OR			
4(B)		Discuss the various advantages and disadvantages of Gas Insulated Substation (GIS)	12	3	2
5(A)		Discuss the relative merits and demerits of underground and overhead systems.	12	4	2
		OR			
5(B)		Explain the functioning of an interconnected distribution system with a suitable diagram.	12	4	2

6(A)	Discuss the different types of power factor tariffs followed in power systems and their purpose.	12	5	2
	OR			
6(B)	Determine the load factor at which the cost of supplying a unit of electricity from a Diesel power station and from a steam power station is the same if the annual fixed and running charges are as follows:	12	5	3

Type of power station	Fixed charges	Running charges
Diesel	₹300 per KW	25 paise per KWh
Steam	₹1200 per KW	6.25 paise per KWh

*****END*****

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

Question Paper Code: 23EEE109

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May – 2026

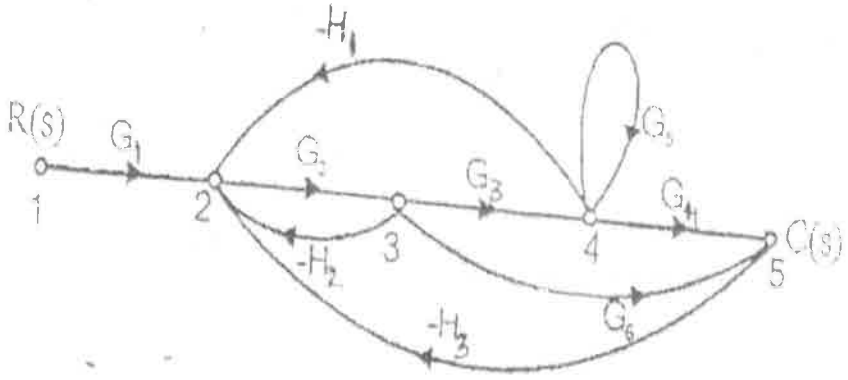
CONTROL SYSTEMS

(Electrical & Electronics Engineering)

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

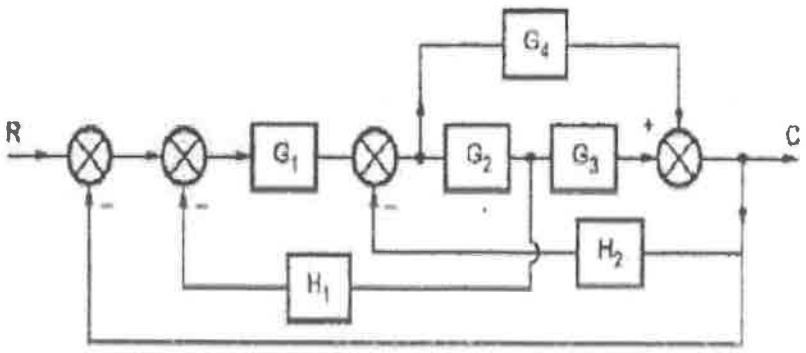
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S.No.		Question	Marks	CO	BL
1.	i)	List the advantages and disadvantages of closed loop system	1	1	2
	ii)	An Automatic washing machine is an example of ..... control system	1	1	1
	iii)	If PD controller is added to the system, what happened about the damping ratio of the system	1	2	2
	iv)	What is steady state error?	1	2	1
	v)	Define stability of a control system.	1	3	1
	vi)	What is the formula for centroid of asymptotes?	1	3	1
	vii)	Define gain crossover frequency (Wgc)	1	4	1
	viii)	List the advantages of lead-lag compensator compared with lag compensator.	1	4	2
	ix)	Define state space model.	1	5	1
	x)	What are the advantages of state space approach?	1	5	2
2(A)		Find the transfer function C(S)/R(S) for the system using signal flow graph.	12	1	3



OR

2(B)		Using Block diagram reduction technique find the Transfer Function of the system.	12	1	3



3(A)	(i)	Explain the time domain specifications with neat sketch.	6	2	2

	(ii)	Explain the effect of proportional integral system in assessing the steady state errors of a system.	6	2	2
		OR			
3(B)		Transfer function of unity feedback control system is $G(s) = \frac{25}{s(s+5)}$. Obtain the rise time, peak time, maximum overshoot and the settling time when the system is subjected to a unity step input.	12	2	3
4(A)	(i)	What are the necessary and sufficient conditions to investigate the stability of the system using Routh- Hurwitz criterion?	6	3	2
	(ii)	The open loop transfer function of unity feedback system is given by $G(s) = \frac{K}{(S+2)(S+4)(S^2+6S+25)}$ By applying R-H criteria discuss the stability of system. Determine the value of K which will cause the sustained oscillations in the closed loop system. What are the corresponding oscillating frequency.	6	3	4
		OR			
4(B)		The open loop transfer function of a unity feedback control system is given by: $G(s) = \frac{K(S+9)}{S(S^2+4S+11)}$ .Sketch the root locus of the system.	12	3	4
5(A)		Sketch the polar plot for the open loop transfer function of a unity feedback system is given by $G(s) = \frac{1}{s(s+1)(1+2s)}$. Determine Gain Margin & Phase.	12	4	4
		OR			
5(B)		Consider the transfer function of a control system: $G(s) = \frac{10}{S(1+0.4S)(1+0.1S)}$.Draw the bode plot and comment on stability of the system.	12	4	4
6(A)	(i)	Derive the expression for the transfer function from the state model. $\dot{X} = AX + Bu$ and Y = CX + Du	6	5	3
	(ii)	Find the state model of the differential equation is $\dddot{y} + 2\ddot{y} + 3\dot{y} + 4y = u$	6	5	3
		OR			
6(B)		Obtain a state model for the system whose Transfer function is given by $\frac{(7S^2+12S+8)}{(S^3+6S^2+11S+9)}$	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 & Supplementary End Semester Examinations, May 2026

INDUCTION AND SYNCHRONOUS MACHINES

(Department of Electrical and Electronics Engineering)

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

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 rotor frequency in an induction motor?	1	1	1
	ii)	What is meant by slip speed?	1	1	1
	iii)	Define torque-slip characteristics.	1	2	1
	iv)	What is blocked rotor test?	1	2	1
	v)	What is split-phase motor?	1	3	1
	vi)	What is capacitor start capacitor run motor?	1	3	1
	vii)	What is EMF equation of an alternator?	1	4	1
	viii)	What is armature reaction?	1	4	1
	ix)	What is synchronous speed?	1	5	1
	x)	What is hunting in synchronous motors?	1	5	1
2(A)	(i)	A slip-ring induction motor runs at 290 r.p.m. at full load, when connected to 50-Hz supply. Determine the number of poles and slip.	6	1	3
	(ii)	Explain the equivalent circuit of an induction motor and its components.	6	1	2
		OR			
2(B)		Explain the principle of operation of a three-phase induction motor and derive the expression for rotor EMF and rotor frequency.	12	1	3
3(A)	(i)	A 3-phase, 400/200-V, Y-Y connected wound-rotor induction motor has 0.06Ω rotor resistance and 0.3 Ω standstill reactance per phase. Find the additional resistance required in the rotor circuit to make the starting torque equal to the maximum torque of the motor.	6	2	3
	(ii)	Explain different methods of starting of induction motors and compare their features.	6	2	2
		OR			
3(B)		Explain the circle diagram of an induction motor and how it is used to determine performance characteristics.	12	2	3
4(A)	(i)	A single-phase motor develops torque proportional to the square of current. If forward field current is 5 A and backward field current is 3 A, calculate net torque.	6	3	3
	(ii)	Explain the working of shaded pole motor with neat sketches.	6	3	2
		OR			
4(B)	(i)	Explain the construction, working, and applications of single-phase induction motors.	12	3	2
5(A)	(i)	Explain the phenomena of armature reaction in alternator for leading load power factor.	6	4	3
	(ii)	Explain the methods of synchronization of alternators.	6	4	2

		OR			
5(B)		Explain the synchronous impedance method and MMF method for determination of voltage regulation.	12	4	3
6(A)	(i)	Explain inverted V curves of a synchronous motor.	6	5	2
	(ii)	Explain different methods of starting synchronous motors.	6	5	2
		OR			
6(B)		Derive the expression for power developed in a synchronous motor and explain power-angle characteristics.	12	5	3

*****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, May - 2026

PROBABILITY AND STATISTICS FOR ENGINEERS

(Department of 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 axioms of probability.	1	1	1
	ii)	Let X and Y be the independent variables with $V(X) = 3$ then find $V(3X - 8)$.	1	1	1
	iii)	Write the formula for the probability density function of a binomial distribution.	1	2	1
	iv)	Let X be a Gamma random variable with parameters $\alpha = 3$, and $\beta = 4$. What is the moment generating function of X?	1	2	1
	v)	What is the condition for two random variables X and Y to be independent?	1	3	1
	vi)	Write the formula for the covariance of two-dimensional continuous random variable X and Y.	1	3	1
	vii)	What is type I error?	1	4	1
	viii)	What is Z-statistic used for single proportion?	1	4	1
	ix)	State the degree of freedom for One-Way ANOVA.	1	5	1
	x)	Write one of the principles of experimental design.	1	5	1
2(A)		In studying the causes of motor failures, these data have been gathered: 5% are due to bearing damage, 80% are due to shaft damage, 1% involves both problems. Based on these percentages, approximate the probability that a given motor failure involves (i) shaft damage given that there is a bearing damage. (ii) bearing damage given that there is shaft damage. (iii) bearing damage but not shaft damage. (iv) shaft damage but not bearing damage.	12	1	3
		OR			
2(B)	(i)	Three automated machines contribute 40%, 35%, and 25% of a factory's total production. The proportion of defective items produced by these machines are 6%, 5%, and 3%, respectively. A finished product is randomly selected and found to be defective. Determine the probability that the defective item came from (i) Machine I, (ii) Machine II, (iii) Machine III.	8	1	3
	(ii)	Let X denote, the number of attempts that must be made to start aircraft, is given the following table: x: 0 | 1 | 2 | 3 | 4 | 5 $p(x)$: 0.7 | 0.2 | 0.05 | 0.03 | 0.01 | $p(5)$ (i) Find $p(5)$ and mean of X. (ii) Find the table for F.	4	1	3
3(A)	(i)	The average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents is (i)at least one, and (ii)at most one on a particular day.	6	2	3
	(ii)	The lifetime risk of developing pancreatic cancer is about one in 78. Let X be the number of people you ask until one says he or she has pancreatic cancer. (i). What is the probability that you ask ten people before one says he or she has pancreatic cancer? (ii). What is the probability that you must ask 20 people?	6	2	3
		OR			
3(B)		The time taken to assemble a machine component is normally distributed with a mean of 50 minutes and a standard deviation of 8 minutes. Determine the probability that the assembly time is, (i) less than 32 minutes, (ii) between 42 and 58 minutes, (iii) more than 26 minutes, (iv)at most 20 minutes.	12	2	3

4(A) Let X be the number of engine faults detected during testing, and Y the number of diagnostic checks performed. 12 3 3

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

(i)Calculate the $E(X)$ and $E(Y)$.
(ii)Find the variances $V(X)$ and $V(Y)$.
(iii)Calculate the covariance $Cov\,(X,Y)$.

OR

4(B) The joint density for (X,Y) is given by, 12 3 3
$f(x,y) = xye^{-x}e^{-y} \quad x > 0, y > 0.$
(i) Find the marginal densities for X and Y.
(ii) Find $Cov\,(X,Y)$.
(iii) Are X and Y independent?
(iv) Find $P[X \leq 1]$.

5(A) It is thought that over 60% of the business offices in the United States have a mainframe computer as part of their equipment. 12 4 3
(i)Set up the appropriate null and alternative hypothesis for supporting this claim.
(ii)When data are gathered, it is found that 233 of the 375 offices studied have mainframe computers. Can H_0 be rejected at the $\alpha = 0.05$ level?
(iii)What practical conclusion can be drawn on the basis of your test results?

OR

5(B) (i) Samples of students were drawn from two colleges and their weights in kilograms during the lockdown period of COVID-19 are gathered and shown below 6 4 3

	Mean	S.D	Sample size
College-A	55	10	400
College-B	57	15	100

Make a large sample test to test the significance of difference between the means at 5% level of significance.

(ii) A sample of 26 bulbs gives a mean life of 990 hours with a standard deviation of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not up to the standard? 6 4 3

6(A) The following table shows the lives in hours of four brands of electric lamps: 12 5 3
Brand
A: 1610, 1610, 1650, 1650, 1680, 1700, 1720, 1800
B: 1580, 1640, 1640, 1700, 1750
C: 1460, 1550, 1600, 1620, 1640, 1660, 1740, 1820
D: 1510, 1520, 1530, 1570, 1600, 1680
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.

OR

6(B) The following data represent the number of units of production per day turned out by 5 different workers using 4 different types of machines: 12 5 3

		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
	5	38	42	49	39

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

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 & Supplementary End Semester Examinations, May 2026

Manufacturing Technology I

(Department of Mechanical Engineering)

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

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 two types of melting furnaces used in foundries.	1	1	1
	ii)	Define casting process.	1	1	1
	iii)	Mention the heat source used in arc welding.	1	2	1
	iv)	List the main classifications of welding processes.	1	2	1
	v)	Mention the two stages of deformation in metals.	1	3	1
	vi)	Write the difference between open die forging and closed die forging.	1	3	1
	vii)	List the types of extrusion processes.	1	4	1
	viii)	Distinguish between forward extrusion and backward extrusion.	1	4	1
	ix)	Identify two factors affecting spring back effect.	1	5	1
	x)	Enumerate two advantages of laser cutting in sheet metal processing.	1	5	1
2(A)		Explain the sand casting process step-by-step, including pattern making, mould preparation, pouring, and solidification.	12	1	2
		OR			
2(B)		Discuss the various pattern allowances used in casting and explain their importance with examples.	12	1	2
3(A)		Describe the gas welding process with neat sketch and discuss its industrial applications.	12	2	3
		OR			
3(B)		Explain the submerged arc welding process and discuss its advantages and limitations.	12	2	2
4(A)	(i)	Describe the open die forging process and its applications.	6	3	2
	(ii)	Analyze the common forging defects and their causes.	6	3	3
		OR			
4(B)		Compare hot working and cold working processes with advantages, limitations, and applications.	12	3	2
5(A)	(i)	Discuss the common rolling defects and their causes.	6	4	3
	(ii)	Analyze the extrusion defects and preventive measures.	6	4	3
		OR			
5(B)		Discuss the design of extrusion dies and design considerations in extrusion process.	12	4	2
6(A)	(i)	Explain the principle and working of rubber forming with suitable applications.	6	5	2
	(ii)	Analyze the advantages and limitations of sheet metal forming processes.	6	5	2
		OR			
6(B)		Explain the electrohydraulic forming and electromagnetic forming processes with advantages and applications.	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 & Supplementary End Semester Examinations, May 2026

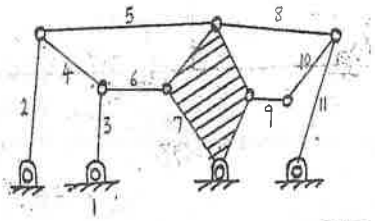
Theory of Machines

(Department of Mechanical Engineering)

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

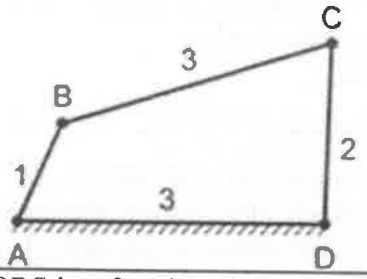
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S. No.		Question	Marks	CO	BL
1.	i)	Write down the mathematical relation between link and pair & joint and link.	1	1	2
	ii)	Define a kinematic pair	1	1	1
	iii)	Why do you study velocity and acceleration for a given mechanism?	1	2	2
	iv)	What is meant by angular acceleration?	1	2	1
	v)	What is sleeve lift in a governor?	1	3	1
	vi)	Classify governors based on construction	1	3	2
	vii)	State two advantages of involute gears over cycloidal gears.	1	4	2
	viii)	Define pressure angle in gears	1	4	1
	ix)	What is the condition for static balancing?	1	5	1
	x)	List any two types of cams.	1	5	1
2(A)		Determine the degree of freedom for the given mechanism.	12	1	3

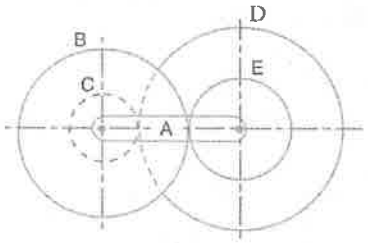


OR

2(B)	Determine the maximum and minimum values of the transmission angle for the four bar chain.	12	1	3



3(A)	PQRS is a four bar chain with link PS fixed. The lengths of the links are PQ = 62.5 mm ; QR = 175 mm ; RS = 112.5 mm ; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity and acceleration diagram when angle QPS = 60°. Find the angular velocity and angular acceleration of links QR and RS.	12	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.	12	2	3

4(A)	An aeroplane makes a complete half circle of 50 metres radius, towards left, when flying at 200 km per hr. The rotary 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 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it.	12	3	3
	OR			
4(B)	The turbine rotor of a ship has a mass of 8 tonnes and a radius of gyration 0.6 m. It rotates at 1800 r.p.m. clockwise, when looking from the stern. Determine the gyroscopic couple, if the ship travels at 100 km/hr and steer to the left in a curve of 75 m radius.	12	3	3
5(A)	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. 	12	4	3
	OR			
5(B)	A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.	12	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.	12	5	3
	OR			
6(B)	A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions.	12	5	3

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 & Supplementary End Semester Examinations, May 2026

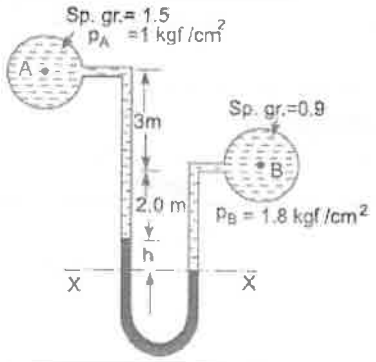
FLUID MECHANICS AND HYDRAULIC MACHINES

(Department of Mechanical Engineering)

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

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 Pressure	1	1	1
	ii)	List any two properties of fluid	1	1	1
	iii)	Define path line	1	2	1
	iv)	What is a laminar flow	1	2	1
	v)	Write the Darcy Weisbach equation in finding the head loss due to friction	1	3	2
	vi)	What is a turbulent flow	1	3	1
	vii)	Give one example of impulse turbine	1	4	1
	viii)	Write the expression to find the force exerted by the jet of water on a stationary vertical plate	1	4	2
	ix)	Define manometric head of a centrifugal pump	1	5	1
	x)	What is a slip in reciprocating pump	1	5	1
2(A)		List out the properties of fluids. Explain them	12	1	2
		OR			
2(B)		A differential manometer is connected at the two points A and B of two pipes as shown in Fig. The pipe A contains a liquid of sp. gr. = 1.5 while pipe B contains a liquid of sp. gr. = 0.9. The pressures at A and B are 1 kgf/cm² and 1.80 kgf/cm² respectively. Find the difference in mercury level in the differential manometer.	12	1	3
3(A)		A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s.	12	2	3
		OR			
3(B)		Write the Bernoulli's statement. Derive an expression of Bernoulli's Equation	12	2	3



4(A)	i)	An oil of sp. gr. 0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200 mm at the rate of 60 litres/s. Find the head lost due to friction for a 500 m length of pipe.	6	3	3
	ii)	Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow of water through the pipe is 250 litres/s.	6	3	3
		OR			
4(B)		List out the minor losses in a pipe flow. Explain any two with a neat sketch.	12	3	2
5(A)		A jet of water of diameter 75 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that the angle between the jet and plate is 60°. Find the force exerted by the jet on the plate (i) in the direction normal to the plate, and (ii) in the direction of the jet	12	4	3
		OR			
5(B)		A Pelton wheel is to be designed for the following specifications: Shaft power = 11,772 kW ; Head = 380 metres ; Speed = 750 r.p.m. ; Overall efficiency = 86% ; Jet diameter is not to exceed one-sixth of the wheel diameter. Determine: (i) The wheel diameter, (ii) The number of jets required, and (iii) Diameter of the jet. Take $K_{v1} = 0.985$, $K_{u1} = 0.45$.	12	4	3
6(A)		Explain the construction and working principle of centrifugal pump with neat sketch	12	5	2
		OR			
6(B)		A single-acting reciprocating pump, running at 50 r.p.m., delivers 0.01 m^3/s of water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine: (i) The theoretical discharge of the pump. (ii) Co-efficient of discharge, and (iii) Slip and the percentage slip of the pump.	12	5	3

*****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 & Supplementary End Semester Examinations, May 2026

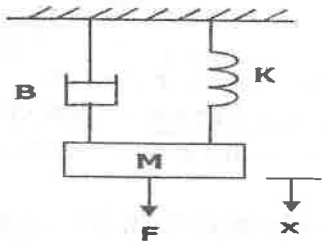
Linear Control Systems

(Department of Electronics & Communication Engineering)

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

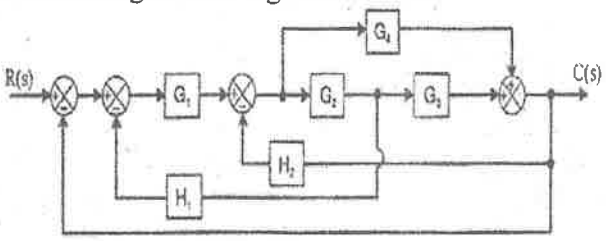
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S. No.		Question	Marks	CO	BL
1.	i)	The open loop transfer function of a negative unity feedback system is $G(s)=\frac{s+10}{s^2+2s+110}$. Determine the closed-loop transfer function.	1	1	1
	ii)	State Mason's gain formula.	1	1	1
	iii)	Define time constant of a first order system with suitable transfer function.	1	2	1
	iv)	Sketch the response of second order underdamped system and show rise time (t_r) in the response?	1	2	1
	v)	Write the limitations of Routh's stability?	1	3	1
	vi)	What is necessary and sufficient condition for stability?	1	3	1
	vii)	State the Nyquist stability criteria.	1	4	1
	viii)	Define phase margin and gain margin.	1	4	1
	ix)	How many state variables are required to completely define the dynamics of a system?	1	5	1
	x)	What is the significance of state transition matrix?	1	5	1
2(A)	(i)	Explain the block diagram reduction rules	6	1	2
	(ii)	Sketch the free body diagram and draw the F-V and F-I analogous electrical circuits of the system shown in below figure	6	1	3

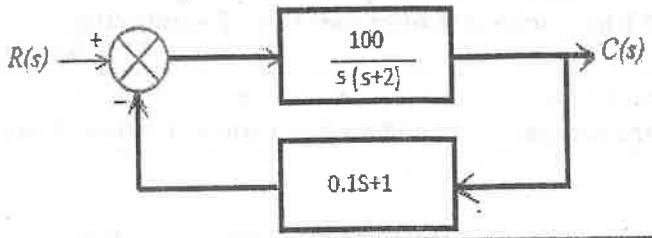


OR

2(B)		Convert the block diagram to signal flow graph and determine the transfer function using Mason's gain formula.	12	1	3



3(A)	(i)	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 12 units.	6	2	3

	(ii)	Explain briefly the effects of PI controller and PID controller on system performance with suitable block diagram?	6	2	2
		OR			
3(B)		A positional control system with velocity feedback is shown in fig. What is the response of the system for unit step input? 	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)	The characteristic equation of a system is $S^4 + 20S^3 + 10S^2 + s + k = 0$ find (a) Range of k for which system is stable (b) frequency of oscillation.	6	3	3
		OR			
4(B)	(i)	Draw the root locus for open loop transfer function define as $G(s) = \frac{K}{S(S+2)(S+4)}$. Also, find the value of K corresponding to crossing point on imaginary axis	12	3	3
5(A)	(i)	The open loop transfer function of a unity feedback system is $G(s) = \frac{1}{s(1+s)(1+2s)}$. Sketch the polar plot and determine the gain margin and phase margin.	6	4	3
	(ii)	How Lead-Lag compensator can be used to improve the transient and steady-state response? Explain with examples.	6	4	2
		OR			
5(B)		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.	12	4	3
6(A)	(i)	Write limitations of Conventional approach compared to state space analysis.	6	5	3
	(ii)	What is State Variable Analysis or State Space Analysis? State the advantages of state variable analysis.	6	5	3
		OR			
6(B)		Discuss the concept of observability. Evaluate the observability of the system. $\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ -2 & -1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U(t)$ and $Y(t) = [1 \quad 0] \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$	12	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 & Supplementary End Semester Examinations, May 2026

EM WAVES AND TRANSMISSION LINES

(Department of Electronics & Communication Engineering)

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

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 Electric field intensity and write the expression for the electric field intensity due to a point charge.	1	1	1
	ii)	List the Maxwell's equations for electrostatics fields	1	1	1
	iii)	State Biot-Savart's law.	1	2	1
	iv)	Write the expression of magnetic field due to infinite current carrying wire.	1	2	1
	v)	What is skin depth?	1	3	1
	vi)	Define Poynting vector.	1	3	1
	vii)	What are primary constants of a transmission line?	1	4	1
	viii)	Write the condition for distortion less line.	1	4	1
	ix)	Define reflection coefficient and VSWR	1	5	1
	x)	Write the expression of input impendence for quarter wave transmission lines	1	5	1
2(A)	(i)	State and prove the Coulomb's law.	6	1	2
	(ii)	Derive the expression for electric field intensity due to an infinite line charge.	6	1	3
		OR			
2(B)	(i)	Define the electric potential, write potential difference and derive relationship between Electric field intensity & electric potential.	6	1	2
	(ii)	State and explain the poisons and Laplace's equation.	6	1	2
3(A)	(i)	Determine the expression for force on a two different elements placed in a magnetic field by using amperes force law	6	2	2
	(ii)	A straight conductor of length 0.4 m carries a current of 15A and is placed perpendicular to a magnetic field of 0.5 Wb/m^2. Calculate the force acting on it.	6	2	3
		OR			
3(B)		Derive Inconsistency of Amperes law and displacement current density	6	2	3
4(A)		Discuss about the wave propagation in lossy dielectric medium and determine expression for α, β in a lossy dielectric medium	12	3	2
		OR			
4(B)		Explain Poynting vector and derive Poynting theorem by using Maxwell's equation	12	3	2
5(A)		Describe the primary constants of a transmission line and show how the secondary constants are obtained. Discuss their significance	12	4	2
		OR			
5(B)	(i)	Show that a transmission line will be distortion less if LG=RC	6	4	3
	(ii)	A distortion less line has Z_0=60ohm, α=20mNp/m μ=0.6c where c is the speed of light in a vaccum. find R,L,G,C and wave length at 100MHZ	6	4	3

6(A)		Derive expression for input impedance of a transmission line terminated with load impedance.	6	5	2
		OR			
6(B)	(i)	Derive expressions for reflection coefficient and VSWR.	6	5	2
	(ii)	A 50 Ω line is terminated with 100 Ω loads. Calculate reflection coefficient and VSWR.	6	5	3

*****END*****

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

Question Paper Code: 23ECE107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May 2026

Analog Circuits

(Department of Electronics & Communication Engineering)

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

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 meant by distortion in amplifiers?	1M	1	1
	ii)	What is the need of multistage amplifier?	1M	1	1
	iii)	Define upper cut-off frequency.	1M	2	1
	iv)	What is the role of internal capacitances in a BJT on frequency behaviour?	1M	2	1
	v)	Which feedback configuration is used in a transimpedance amplifier?	1M	3	1
	vi)	Name the feedback topology used for current amplification.	1M	3	1
	vii)	For a Hartley oscillator, at resonance condition calculate the frequency for $L = 50\mu H, C = 100pF$.	1M	4	3
	viii)	What is the main advantage of a Wien-bridge oscillator?	1M	4	1
	ix)	What is the main advantage of a Class AB amplifier?	1M	5	2
	x)	Define thermal runaway.	1M	5	1
2(A)		Apply small-signal analysis to a cascaded RC-coupled amplifier and evaluate the overall voltage gain and bandwidth.	12M	1	3
		OR			
2(B)		Consider a MOS differential pair where the current source has a finite output resistance R_{SS} = 50kΩ. The transconductance of the MOSFETs is g_m = 2 mA/V and the load resistance is R_D = 15.2kΩ. Calculate: (i) The Common-Mode Gain A_{cm}, (ii) Differential Mode gain Ad (ii) CMRR in decibels (dB)	12M	1	3
3(A)		Apply frequency response concepts to determine the lower cut-off frequency of a CS amplifier.	12M	2	3
		OR			
3(B)		Illustrate the high-frequency behaviour of CS amplifiers by utilizing the internal capacitance models.	12M	2	3
4(A)		Describe the operation of a Series-Shunt (voltage-series) feedback amplifier and determine its effect on input and output impedances.	12M	3	3
		OR			
4(B)		The input and output voltages of a voltage series feedback amplifier are 60mV and 5V, respectively. If the feedback factor is 0.01, a) Determine the factor by which the input and output impedances change. If the bandwidth of the open-loop amplifier is 10 MHz, find the bandwidth of the voltage series feedback.	12M	3	3
5(A)		Draw the circuit diagram of a Hartley oscillator using a transistor and analyse its operation.	12M	4	3
		OR			
5(B)		Apply the concept of LC oscillations to explain the working of the Colpitts oscillator	12M	4	3
6(A)		Analyse the working of a Class B push-pull amplifier and the cause of crossover distortion.	12M	5	3
		OR			
6(B)		A Class AB amplifier operates with $V_{CC} = 16\,V$, $R_L = 7\,\Omega$, and a small quiescent current $I_{CQ} = 0.1\,A$. Find: (i) P_{DC}; (ii) P_{AC}(assume peak output = V_{CC});(iii) Efficiency	12M	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 & Supplementary End Semester Examinations, May 2026

Analog Communication

(Department of Electronics & Communication Engineering)

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

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 random process.	1	1	1
	ii)	What is autocorrelation function?	1	1	1
	iii)	Suppose $m_1 = 0.30, m_2 = 0.40, m_3 = 0.65,$ and $m_4 = 0.80$. Calculate the total modulation index	1	2	2
	iv)	What is noise figure?	1	2	1
	v)	The frequency deviation produces in a VHF carrier by a signal of 100Hz is 50kHz. Calculate the frequency modulation index.	1	3	2
	vi)	Sketch the block diagram to obtain FM signal from a PM modulator.	1	3	1
	vii)	A bandpass filter has range from 10kHz to 20kHz. Find the maximum sampling frequency.	1	4	2
	viii)	What is aliasing?	1	4	1
	ix)	A discrete Memoryless Source (DMS) X has four symbols x1, x2, x3, x4 with probabilities P(x1) = 0.4, P(x2) = 0.3, P(x3) = 0.2, P(x4) = 0.1. Calculate the entropy of the source.	1	5	2
	x)	What is channel capacity?	1	5	1
2(A)	(i)	Explain Gaussian random variable and its significance.	6	1	2
	(ii)	Explain the concept and significance of a Binomial random variable.	6	1	2
		OR			
2(B)		Let $X(t) = A\,cos(\omega t + \phi)$ and $Y(t) = A\,sin(\omega t + \phi)$, where A and ω are constants and ϕ is a uniform random variable $[0,\ 2\pi]$. Find the cross correlation of $X(t)$ and $Y(t)$.	12	1	3
3(A)	(i)	Derive total power of AM wave and efficiency.	6	2	3
	(ii)	Compare DSB-SC AM and SSB AM systems.	6	2	3
		OR			
3(B)		A transmitter transmits an AM/DSB single tone-modulating signal given by $f_m = 3cos(2\pi 10^3 t)\ volt$ with a carrier signal given by $f_c = 10\cos(2\pi 10^6 t)\ volt$. Calculate (i) Modulation depth, (ii) USB & LSB frequencies, (iii) Amplitude of sideband frequencies, and (iv) Efficiency of transmission.	12	2	3
4(A)	(i)	Derive FM wave expression.	6	3	3
	(ii)	Explain pre-emphasis and de-emphasis.	6	3	2
		OR			
4(B)		A sinusoidal modulating waveform of amplitude 5V and a frequency of 2kHz is applied to FM generator, which has a frequency sensitivity of 40Hz/volt. Calculate the frequency deviation, modulation index, and bandwidth.	12	3	3
5(A)	(i)	Explain sampling theorem with diagram.	6	4	2

	(ii)	Explain PAM generation and detection with appropriate diagram.	6	4	2
		OR			
5(B)		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 fs = 8kHz. (i) Calculate the transmission bandwidth of TDM channel. (ii) Calculate the sampling interval. (iii) Calculate the time allotted to each channel. (iv) Calculate the pulse rate (signaling rate).	12	4	3
6(A)	(i)	Define entropy and information rate.	6	5	2
	(ii)	An analog signal having bandwidth of 4 kHz is sampled at 1.25 times the Nyquist rate, with each sample encoded to 8 bits of binary. Assume all samples are equally likely. (i) What is information rate of this source? (ii) Can the output of this source be transmitted without error over an AWGN channel with bandwidth of 10 kHz and SNR of 20 dB?	6	5	3
		OR			
6(B)		A voice grade channel of the telephone network has a bandwidth of 3.4 KHz. (i) Calculate channel capacity of the telephone channel for signal to noise ratio of 30dB. (ii) Calculate the minimum SNR required to support information transmission through the telephone channel at the rate of 4800 bits/sec.	12	5	3

*****END*****

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

Question Paper Code: 23CSE107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May– 2026

OPERATING 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)	Compare user mode and Kernel Mode.	1	1	1
	ii)	List out the various types of services offered by the operating systems.	1	1	1
	iii)	Differentiate between hard real-time and soft real-time operating systems.	1	2	1
	iv)	If a process arrives at time 0, has a burst time of 10ms, and finishes at time 15ms, calculate its Waiting Time.	1	2	1
	v)	List the types of Semaphore.	1	3	1
	vi)	What are the four Coffman conditions of deadlock?	1	3	1
	vii)	In a system with memory holes of 100KB, 500KB, and 200KB, where would a 150KB process be placed using the Worst Fit algorithm?	1	4	1
	viii)	Which memory allocation strategy is generally the fastest because it stops searching as soon as it finds a suitable hole?	1	4	1
	ix)	State the primary purpose of a file extension.	1	5	1
	x)	Find the file access method where records are accessed one after another in a fixed order.	1	5	1
2(A)	(i)	List and explain the various structures of Operating systems.	6	1	2
	(ii)	Describe the various services provided by an Operating System with neat diagrams.	6	1	2
		OR			
2(B)		Explain system calls in detail, including their types and role in operating systems. Illustrate your answer by simulating a C program that uses UNIX system calls to open a file and display its contents.	12	1	2
3(A)	(i)	With a neat sketch (process state diagram), explain various states the process may undergo from its creation to its termination	6	2	2
	(ii)	List and explain the various thread libraries in detail.	6	2	2
		OR			
3(B)		Solve the problem by considering the following set of processes, with the length of the CPU burst time given in milliseconds:	12	2	3

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order p1, p2, p3, p4, p5, all at time 0.

(i) Draw Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, priority (a smaller priority number implies a higher priority).

(ii) Find the average turnaround time and waiting time of the process using the above techniques.

4(A) Solve the problem using the banker's algorithm by considering the following snapshot of a system P0, P1, P2, P3, P4 and three resources of type A, B, C Resource type A has 10 instances, B has 5 Instances and C has 7 instances. If P1 Process request (1 0 2) — 12 — 3 — 3

Process	Allocation			Max		
	A	B	C	A	B	C
P0	0	1	0	7	5	3
P1	2	0	0	3	2	2
P2	3	0	2	9	0	2
P3	2	1	1	2	2	2
P4	0	0	2	4	3	3

a) Find the need matrix.

b) Is the system being safe? If safe write down the safety sequence of the process

OR

4(B) Discuss on process synchronization. Illustrate any two classical problems of synchronization. — 12 — 3

5(A) (i) Explain about the need and concept of paging technique in memory management — 6 — 4 — 2

(ii) Discuss the virtual memory of operating system in detail. — 6 — 4 — 2

OR

5(B) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999.The drive is currently Serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in FIFO order is 86,1470,913,1774,948,1509,1022,1750,130.
Starting from current head position, what is a total distance (in cylinders) that the Disk arm move to satisfy all a pending request, for each of the following disk Scheduling algorithms? — 12 — 4 — 3

6(A) A disk has 100 blocks. A file named Data.txt requires 5 blocks (indices 2, 10, 15, 20, 25). Show the disk structure and calculate number of disk I/O operations required to access the 4th block of this file using:
(a) Contiguous Allocation (assuming it starts at block 10).
(b) Linked Allocation.
(c) Indexed Allocation — 12 — 5 — 3

OR

6(B) Explain about the different types of file allocation methods with neat diagram. — 12 — 5 — 2

*****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 & Supplementary End Semester Examinations, May – 2026

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)	List the types of software development projects.	1	1	1
	ii)	What are the advantages of Spiral Model?	1	1	1
	iii)	List characteristics of good SRS Document.	1	2	1
	iv)	What is Delphi technique?	1	2	1
	v)	Mention the primitive symbols used for constructing DFDs.	1	3	1
	vi)	What is Menu-based Interface?	1	3	1
	vii)	What is the purpose of smoke testing in software development?	1	4	1
	viii)	What does white-box testing focus on?	1	4	1
	ix)	List the benefits of CASE.	1	5	1
	x)	What are the advantages of reusability?	1	5	1
2(A)		Explain about the agile development model in detail.	12	1	2
		OR			
2(B)		Discuss the key principles, phases, advantages, limitations, and scenarios where RAD is more effective than traditional models.	12	1	2
3(A)	(i)	Discuss the complexities involved in software project management.	6	2	2
	(ii)	Differentiate between coupling and cohesion.	6	2	2
		OR			
3(B)		Describe about the various metrics used for software project size Estimation.	12	2	2
4(A)	(i)	What is a DFD? Explain about the process involved in preparing the DFDs.	6	3	3
	(ii)	Discuss different types of User Interfaces.	6	3	2
		OR			
4(B)		Illustrate the phases of eXtreme Programming(XP). State the advantages and disadvantages of using Agile methods.	12	3	2
5(A)	(i)	Discuss the key concepts of software Realiability and Quality Management in the context of Software Engineering.	6	4	2
	(ii)	Describe Code Review in detail.	6	4	3
		OR			
5(B)		Illustrate SEI Capability Maturity Model.	12	4	3
6(A)		Explain about the various Software Maintenance process models and cost estimation techniques.	12	5	5
		OR			
6(B)		Discuss the concept of software reuse and its significance in software engineering.	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 & Supplementary End Semester Examinations, May – 2026

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)	Define a database management system (DBMS).	1	1	1
	ii)	Differentiate between schema and instance.	1	1	2
	iii)	List the constraints in DBMS.	1	2	1
	iv)	What is relational algebra?	1	2	1
	v)	Write SQL query to select all records from STUDENT tab.	1	3	2
	vi)	Define updatable view.	1	3	1
	vii)	What is the importance of surrogate key in database design	1	4	1
	viii)	Write the purpose of normalization.	1	4	1
	ix)	What is Deadlock in DBMS?	1	5	1
	x)	Define Durability.	1	5	1
2(A)	(i)	Describe data models used in database systems. Which model is most widely used and why?	6	1	2
	(ii)	Explain the three-tier schema architecture of a DBMS. How does it achieve data independence?	6	1	2
		OR			
2(B)		Design an EER diagram for a university showing PERSON generalized into STUDENT and STAFF, with STAFF further specialized into FACULTY and ADMIN.	12	1	3
3(A)	(i)	Discuss in detail about domain, attribute, tuple and relation with examples.	6	2	2
	(ii)	Write SQL statements to CREATE the following tables: STUDENT(Roll_No, Name, DOB, Dept_ID) and DEPARTMENT(Dept_ID, Dept_Name, HOD). Apply appropriate constraints.	6	2	3
		OR			
3(B)		Consider a database with tables STUDENT(Roll_No, Name, Marks, Dept) and COURSE(Course_ID, Course_Name, Credits). Write SQL statements for: (a) Create both tables, (b) Insert 3 records each, (c) Update marks of a student, (d) Delete a course.	12	2	3
4(A)	(i)	Create EMPLOYEE table with primary key and NOT NULL constraints.	6	3	3
	(ii)	Explain any three types of SQL join operations with suitable examples	6	3	2
		OR			
4(B)	(i)	Illustrate SQL aggregate functions with suitable examples. Also discuss the role of GROUP BY and HAVING clauses in query processing.	12	3	3

5(A)	(i)	Explain the purpose of normalization and schema refinement with example.	6	4	2
	(ii)	Discuss Fifth Normal Form (5NF) and its importance in schema refinement.	6	4	3
		OR			
5(B)		Discuss Boyce-Codd Normal Form (BCNF). Compare BCNF with Third Normal Form.	12	4	2
6(A)	(i)	Construct a hash index for the keys 15, 23, 7, 32, 14, 18, 41 using the hash function h(k)=kmod7	6	5	3
	(ii)	Explain serializability and recoverability with examples.	6	5	2
		OR			
6(B)		Explain the ACID properties of a transaction with suitable examples.	12	5	2

*****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 & Supplementary End Semester Examinations, May – 2026

PROBABILITY AND STATISTICS FOR COMPUTER SCIENCE

(Common to CSE-CS and CST)

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)	The function f(x) = kx^3 in 0 < x < 1 is a valid *p.d.f.* find the value of k	1	1	2
	iii)	X is the binomial with parameters n= 10 and p= 0.3 find variance of X.	1	2	2
	iv)	Define exponential distribution.	1	2	1
	v)	Define continuous joint density function.	1	3	1
	vi)	Define independence of random variables.	1	3	1
	vii)	What is Skewness?	1	4	1
	viii)	Define regression coefficient of Y on X.	1	4	1
	ix)	Find the standard error, if P=0.5 and the sample size is 750	1	5	2
	x)	What is degrees of freedom.	1	5	1
2(A)	(i)	In analysing, the causes of system failures in a distributed computing environment, the following data has been collected: 5% of failures are due to server hardware faults, 80% of failures are due to network issues and 1% of failures involve both server faults and network issues. Based on these statistics, estimate the probability that a given system failure involves: (a) A network issue given that there is a server hardware fault (b) A server hardware fault but not a network issue (c) A server hardware fault or a network issue	6	1	3
	(ii)	State and Prove Baye's Theorem.	6	1	3
		OR			
2(B)		Let X denote the length in minutes of a long-distance telephone conversation. The density for X is given by $f(x)=\frac{1}{10}e^{-\frac{x}{10}};\quad x>0.$ Find (a) $p(X\geq 10)$ (b) $p(5\leq X\leq 20)$ (c) mean (d) variance	12	1	3
3(A)		Derive the moment generating function of binomial distribution and find mean and variance.	12	2	3
		OR			
3(B)		Find moment generating function of Normal distribution and then find mean and variance.	12	2	3
4(A)		For the following bivariate probability distribution, calculate (i) E(X) and E(Y) (ii) V(X) and V(Y) (iii) Cov(X, Y) (iv) the conditional distribution of X given Y=2	12	3	4

X\Y	0	1	2
-1	1/15	3/15	2/15
0	2/15	2/15	1/15
1	1/15	1/15	2/15

OR

4(B)	The joint density for (X,Y) is given by $f(x,y)=\frac{x^3y^3}{16} \quad 0\le x\le 2, 0\le y\le 2$ (a) Find the marginal densities for X and Y. (b) Find $p(X\le 1, Y\le 1)$ (c) Find V(X) (d) Find Cov(X, Y)	12	3	3
5(A)	Calculate the first four moments of the following distribution about the mean. Also calculate β_1 and β_2.	12	4	4

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

OR

5(B)	A data scientist is analyzing the relationship between CPU usage (%) denote X and power consumption (in watts) of a computing system denote Y. The following dataset contains observations collected from different workloads: (a) Obtain the lines of regression of Y on X and X on Y. (b) Estimate the power consumption when CPU usage is 60%.	12	4	4

X	56	42	72	36	63	47	55	49	38	68
Y	147	125	160	118	149	128	150	145	115	152

6(A)	A data analyst is comparing the performance of two cloud-based computing systems during a high-demand period. The average response time (in milliseconds) and variability of response times were recorded for both systems. The collected data is summarized below: Perform a large sample hypothesis test to determine whether there is a significant difference between the mean response times of the two systems at a 5% level of significance.	12	5	3

System	Mean Response Time (ms)	Standard Deviation	Sample Size
System A	55	10	400
System B	57	15	100

OR

6(B)	Two independent sample of sizes 7 and 6 have the values: Examine whether the samples have been drawn from normal populations having the same variance? ($F_{0.05}(5,6)=4.39$)	12	5	4

Sample A	28	30	32	33	33	29	34
Sample B	29	30	30	24	27	29	-

*****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 & Supplementary End Semester Examinations, May – 2026

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)	Define an algorithm?	1	1	1
	ii)	Arrange the following order of growth from slowest to fastest: $O(n^2)$, $O(\log n)$, $O(n \log n)$, $O(2^n)$, $O(n)$.	1	1	1
	iii)	What is the best-case time complexity of Quick Sort?	1	2	2
	iv)	Define Strassen's matrix multiplication and state its advantage over naive method.	1	2	1
	v)	What is a Minimum Spanning Tree?	1	3	2
	vi)	Distinguish between the 0/1 Knapsack and Fractional Knapsack problems.	1	3	1
	vii)	Recall the principle of backtracking?	1	4	1
	viii)	Define the Branch and Bound method. How does it differ from backtracking?	1	4	1
	ix)	Define P problems and NP problems.	1	5	1
	x)	What is the main benefit of using a randomized algorithm?	1	5	1
2(A)		Describe asymptotic notations Big-O, Big-Theta, and Big-Omega. Explain their importance in analyzing algorithm efficiency with example.	12	1	2
		OR			
2(B)		Solve the following recurrence relations using both the Substitution Method and Master's Theorem (where applicable), and classify the asymptotic complexity of each: (i) $T(n) = 2T(n/2) + n$, $T(1) = 1$ (ii) $T(n) = T(n-1) + n^2$, $T(1) = 1$ Provide step-by-step derivation for each.	12	1	3
3(A)	(i)	Distinguish between merge sort and quick sort.	6	2	2
	(ii)	Arrange the following numbers in increasing order using merge sort (10, 18, 29, 68, 32, 43, 37, 87, 24, 47, and 50).	6	2	3
		OR			
3(B)		Describe the divide and conquer strategy? Explain the working strategy of Binary Search and find element 60 from the below set by using the above technique: {10, 20, 30, 40, 50, 60, and 70}. Analyze time complexity for binary search.	12	2	3
4(A)		Solve the Job Sequencing with Deadlines problem using the Greedy method: Jobs: J1(p=100, d=2), J2(p=19, d=1), J3(p=27, d=2), J4(p=25, d=1), J5(p=15, d=3) Sort jobs by profit, apply feasibility check, show slot assignments, and compute maximum profit. Justify why the greedy choice is optimal here.	12	3	3
		OR			

4(B)		Apply the dynamic programming approach to solve the 0/1 Knapsack problem: Items: (w=1, v=1), (w=2, v=6), (w=3, v=10), (w=5, v=16); Capacity W=6. Construct the DP table row by row, trace back to identify selected items, and state the maximum value achievable.	12	3	4
5(A)	(i)	Explain graph coloring problem in detail.	6	4	2
	(ii)	Draw the state space tree for m coloring when n=3 and m=3.	6	4	2
		OR			
5(B)		Apply the Backtracking algorithm to solve the Sum of Subsets problem. Given: n=4, (w1, w2, w3, w4) = (14, 13, 4, 7) and M=31.Draw the portion of the state space tree.	12	4	3
6(A)	(i)	Explain 0/1 knapsack problem in Branch and Bound technique.	6	5	2
	(ii)	Differentiate between NP - Hard and NP Complete classes.	6	5	2
		OR			
6(B)		Apply the Branch and Bound method to solve the Travelling Salesperson Problem (TSP) for the following distance matrix: A B C D A [0, 10, 15, 20]; B [10, 0, 35, 25]; C [15, 35, 0, 30]; D [20, 25, 30, 0] Compute lower bounds using row/column reduction, draw the B&B search tree, and determine the optimal tour and its cost.	12	5	4

*****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 & Supplementary End Semester Examinations, May– 2026

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)	List out the layers in TCP/IP Model	1	1	1
	ii)	What are the advantages of Star Topology?	1	1	1
	iii)	What is HDLC? Specify its uses.	1	2	1
	iv)	List the services provided by the Data link layer.	1	2	1
	v)	Specify the range of Class D and E.	1	3	1
	vi)	What are the responsibilities of network layer?	1	3	1
	vii)	What is four-way handshake protocol.	1	4	1
	viii)	Draw the UDP header.	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)	(i)	Compare LAN, MAN, and WAN in terms of coverage and use cases.	6	1	2
	(ii)	List and explain any three functions of network hardware	6	1	2
		OR			
2(B)		Formulate and discuss the various types of transmission media, Highlighting their merits and demerits.	12	1	2
3(A)	(i)	Examine the various services in the Data link layer	6	2	3
	(ii)	Describe the Hamming Code and its role in error correction. Provide an example to illustrate it's working.	6	2	2
		OR			
3(B)		Explain how to perform a CRC check with a 5-bit generator polynomial 11001. Walk through the entire process, including dividing the data by the generator polynomial and appending the remainder to the original data. Use the data sequence 110101111 in your explanation.	12	2	4
4(A)	(i)	Explain Packet Switching in detail with types and advantages	6	3	2
	(ii)	Differentiate between the Classful addressing and Classless addressing.	6	3	2
		OR			
4(B)		Analyze the differences between Class A, Class B, and Class C and division of IP address classes in Classful Addressing.	12	3	4
5(A)	(i)	Explain the key transport services provided by the transport layer in computer networks.	6	4	2
	(ii)	Differentiate between TCP and UDP protocols.	6	4	2
		OR			
5(B)		Explain the operation of Transmission Control Protocol (TCP) with neat sketch.	12	4	4

6(A)	(i)	Compare POP3 and IMAP protocols in terms of functionality and use cases.	6	5	4
	(ii)	Discuss the File transfer Protocol (FTP) with a neat diagram.	6	5	2
		OR			
6(B)		Analyze the effectiveness of different types of firewalls in network security.	12	5	4

*****END*****

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

Question Paper Code: 23CST105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May – 2026

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)	What is interrupt handling?	1	1	1
	ii)	What is loop in shell scripting?	1	1	1
	iii)	Define process state.	1	2	1
	iv)	What is fork() system call?	1	2	1
	v)	What is a race condition?	1	3	1
	vi)	What are wait() and signal() operations?	1	3	1
	vii)	Define paging?	1	4	1
	viii)	State advantages of memory management?	1	4	1
	ix)	State purpose of free space management.	1	5	1
	x)	Mention any two file system performance factors.	1	5	1
2(A)	(i)	Illustrate the step-by-step mechanism of how the operating system uses System Calls and Interrupts to bridge the gap between the user application and the hardware.	6	1	2
	(ii)	Demonstrate how the concept of a Virtual Machine can be implemented to solve a multi-platform dependent problem	6	1	2
		OR			
2(B)		Apply shell scripting techniques to develop a program for file handling operations.	12	1	3
3(A)	(i)	Examine the structure of Process Control Block (PCB).	6	2	4
	(ii)	Analyze PCB role in process management.	6	2	4
		OR			
3(B)		Analyze SJF (Non-preemptive) scheduling for P1(0,6), P2(1,2), P3(2,8), P4(3,3); compute average WT.	12	2	4
4(A)	(i)	Examine the concept of critical section.	6	3	4
	(ii)	Evaluate how deadlock prevention techniques eliminate hold-and-wait condition.	6	3	4
		OR			
4(B)		Apply semaphore mechanism to solve the Dining Philosopher problem and illustrate execution.	12	3	4
5(A)	(i)	Evaluate segmentation technique.	6	4	4
	(ii)	Analyze advantages of segmentation over paging.	6	4	4
		OR			
5(B)		Apply Second Chance (Clock) page replacement algorithm for reference string (2, 3, 2, 1, 5, 2, 4, 5, 3, 2) with 3 frames and compute page faults.	12	4	4
6(A)	(i)	Illustrate file allocation methods.	6	5	2
	(ii)	Illustrate how indexed allocation improves performance with example.	6	5	2
		OR			
6(B)		Apply disk scheduling concepts to explain C-SCAN algorithm with suitable example.	12	5	3

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 & Supplementary End Semester Examinations, May – 2026

DISCRETE MATHEMATICAL STRUCTURES

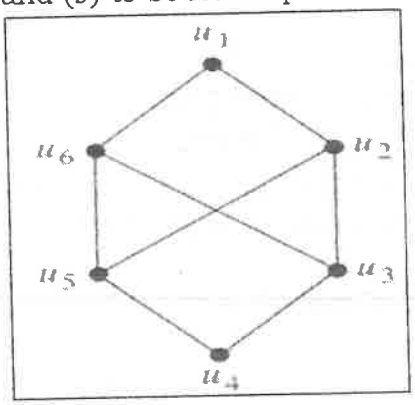
(CSE, DS, AI and AI&ML)

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

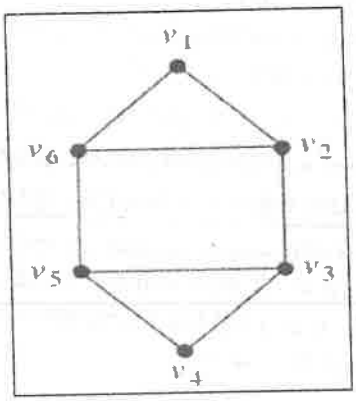
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S.No.		Question	Marks	CO	BL
1.	i)	Consider the propositions: p: Mathematicians are generous, q: Spiders hate algebra. Write the compound proposition symbolized by $\overline{P} \rightarrow \overline{Q}$	1	1	1
	ii)	State modus ponens rule in logic equivalence	1	1	1
	iii)	Define monoid and a group.	1	2	1
	iv)	Estimate a subgroup of order 5 in the group $(Z_{10}, +_{10})$.	1	2	2
	v)	Define TOSET.	1	3	1
	vi)	Write an example of a Boolean algebra.	1	3	2
	vii)	Compute the value of $a_3 - 2a_2$ when $a_n = a_{n-1}$ and $a_0 = 3$.	1	4	1
	viii)	Construct the sequence $\{a_n\}$ for the generating function $\frac{1}{1-2x}$.	1	4	1
	ix)	Draw a simple undirected graph with 4 vertices and 5 edges.	1	5	1
	x)	Find the adjacent matrix representation for a complete graph K_4.	1	5	2
2(A)	(i)	Use truth value tables to establish $\overline{A} \rightarrow B$ and $A \leftrightarrow \overline{B}$ when $A: p \wedge q \rightarrow (q \wedge \overline{p})$ and $B: p \wedge q \rightarrow (\overline{q} \wedge p)$.	6	1	3
	(ii)	Apply truth tables to construct $X \wedge Y$ and $X \vee Y$ when $X: p \rightarrow (q \rightarrow p)$ and $Y: q \rightarrow (p \rightarrow q)$.	6	1	3
		OR			
2(B)		Apply appropriate inference rules to determine whether the following logical expressions are valid: (i) $R \rightarrow S$ can be derived from the premises $P \rightarrow (Q \rightarrow S)$, $\neg R \vee P$, and Q (ii) $S \vee R$ is a tautologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$.	12	1	3
3(A)	(i)	Establish the concept of bit strings over the alphabet $\{0, 1\}$ with suitable examples. Using counting principles, determine the number of bit strings of length 8 that start with a 1, or end with the two bits 00.	6	2	3
	(ii)	Verify that $\mathbb{Z}_5 - \{0\}$ forms a group under multiplication modulo 5, and test whether $\mathbb{Z}_4 - \{0\}$ forms a group under multiplication modulo 4.	6	2	3
		OR			
3(B)		Explain isomorphism of two groups. Analyse and determine whether the groups $(\{[1], [3], [7], [9]\}, \times_{10})$ and $(Z_4, \oplus_4)$ are isomorphic. Further, examine whether the group $(S_3, \circ)$ is isomorphic to $(Z_6, \oplus_6)$.	12	2	3
4(A)		Verify that the following Lattices are Boolean algebras or not: (i) $(P(S), \cup, \cap, ', \emptyset, S)$, (ii) $(D_{30}, \text{lcm}, \text{gcd}, ', 1, 30)$, (iii) $(D_{24}, \text{lcm}, \text{gcd}, ', 1, 24)$.	12	3	3
		OR			

4(B)	Use the divisibility relation of positive integer to design the Hasse diagrams of structures $(D_{12}, \mid)$and $(D_{24}, \mid)$, where D_n denotes the set of positive divisors of n, and verify that these are either Posets, or Tosets, or both.	12	3	3
5(A)	(i) Derive the explicit formula using the characteristic root method for the Fibonacci sequence $\{f_n\}$ defined by $f_n = f_{n-1} + f_{n-2}$, $f_0 = 0$, $f_1 = 1$.	6	4	3
	(ii) Express the solution of the linear non-homogeneous recurrence relation $a_n = a_{n-1} + a_{n-2} + 1, n \geq 2$, with $a_0 = 0$, $a_1 = 1$, explicitly in terms of Fibonacci numbers.	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: (i) $a_n = 8a_{n-1} + 10^{n-1}$, $a_0 = 1$. (ii) $a_n = a_{n-1} + 2a_{n-2} + 2^n$, $a_0 = 4$, $a_1 = 12$.	12	4	3
6(A)	(i) Examine the necessary and sufficient conditions for two graphs (a) and (b) to be isomorphic	6	5	3

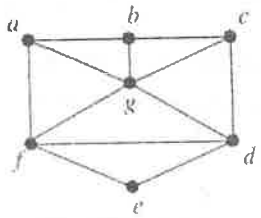


(a)

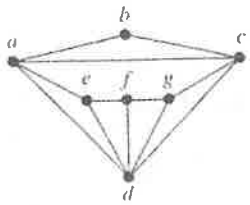


(b)

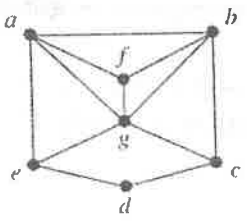
	(ii) Construct the adjacency matrices of the graphs K_6 and $K_{3,3}$, and check whether they are isomorphic or not.	6	5	3
	OR			
6(B)	Apply the necessary and sufficient conditions of isomorphic graphs to show that one and only one pair of these graphs is isomorphic.	12	5	3



Γ_1



Γ_2



Γ_3

END

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

Question Paper Code: 23CAI103 /23CSD103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May – 2026

DIGITAL LOGIC & 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)	Realize a XOR gate using NAND gates only.	1	1	1
	ii)	Convert the Binary Code 1010011 to equivalent gray Code.	1	1	1
	iii)	Write the characteristic equation of a J-K Flip Flop.	1	2	1
	iv)	Mention the advantages of Von-Neumann Architecture.	1	2	1
	v)	Enumerate the various registers of x86 family of processors.	1	3	2
	vi)	Define IR and program counter.	1	3	1
	vii)	Write down the write policies in cache.	1	4	1
	viii)	Differentiate between EPROM and EEPROM.	1	4	2
	ix)	What is DMA?	1	5	1
	x)	List out the various hazards in instruction pipelining.	1	5	2
2(A)	(i)	Design 3 to 8 Decoder with suitable logic gates	6	1	3
	(ii)	Design 8 to 1 Multiplexer with suitable logic gates.	6	1	3
		OR			
2(B)		Using K-map method, simplify the given Boolean function and obtain minimum SOP expression. $F(A,B,C,D) = \sum m(1,3,5,7,9) + d(2,8,15)$. Also draw the minimized circuit diagram.	12	1	3
3(A)		Explain the working of SR Flip Flop with a neat logic diagram and derive the characteristic equation and its excitation table.	12	2	2
		OR			
3(B)		Explain the various functional blocks of a Computer System with a neat diagram.	12	2	2
4(A)		Draw the flowchart for the Booths algorithm and illustrate the process of signed multiplication for the given data: $(6)_{10} * (-4)_{10}$.	12	3	4
		OR			
4(B)		What is an addressing mode? Illustrate the x86 addressing modes with suitable diagrams.	12	3	3
5(A)		Explain the basic concepts of Cache. Illustrate the various Cache Memory Mapping Techniques.	12	4	2
		OR			
5(B)		Consider a machine with byte addressable main memory of 64 KB and block size of 8 bytes. Assume a direct mapped cache memory consisting of 32 lines is used with this machine. (i) Determine how this 16-bit memory address is divided into tag, line number and byte number.	12	4	4

	(ii) Into what cache line would the bytes with each of the following addresses stored? (a) 0001 0111 1000 0110 (b) 1010 1111 1110 1010 (c) 1101 0000 0001 1101			
6(A)	Explain the taxonomy of Flynn's Parallel Processor architectures.	12	5	2
	OR			
6(B)	Discuss the working of a six-stage instruction pipeline with a suitable timing diagram. Assume all the instruction stages are of equal duration.	12	5	2

*****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 & Supplementary End Semester Examinations, May – 2026

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)	What is bias-variance trade-off?	1	1	1
	ii)	Define structured and unstructured data and provide suitable examples.	1	1	1
	iii)	Compute the Euclidean distance and Manhattan distance between the points A(3,4) and B(7,1).	1	2	2
	iv)	Define Parzen window.	1	2	1
	v)	Recall the main idea behind the Random Forest algorithm.	1	3	1
	vi)	Identify the formula of Bayes' Theorem.	1	3	2
	vii)	What are the two main phases of the Backpropagation algorithm?	1	4	1
	viii)	Write a note on the sigmoid function used in Logistic Regression.	1	4	1
	ix)	What is the main objective of clustering in unsupervised learning?	1	5	1
	x)	Write the key difference between hard and soft clustering.	1	5	1
2(A)	(i)	Identify and explain the different types of data in Machine Learning with suitable examples.	6	1	3
	(ii)	Calculate appropriate performance metrics for a classification and relevant evaluation metrics for a regression for any suitable dataset.	6	1	3
		OR			
2(B)		Illustrate the architecture of a machine learning pipeline, demonstrate the key stages involved from data collection to deployment, by applying real-world examples to each stage.	12	1	3
3(A)	(i)	The sales of a company (in millions of dollars) for each year are shown below:	6	2	3

Year	2019	2020	2021	2022	2023
Sales	12	19	29	37	45

Find the least squares regression line.

	(ii)	Use the model given in 3A(i) to estimate the company's sales in 2026.	6	2	3
		OR			
3(B)		Apply Univariate regression to a small dataset and demonstrate how to calculate Mean Absolute Error (MAE), Sum of Squared Error (SSE), Sum of Squared residual (SSR) and Sum of Squared Error Total (SSTO).	12	2	3
4(A)		Using the given dataset, utilize the Naive Bayes classifier to determine whether a person with attributes (Age Group = Senior, Income = Medium, Student = Yes, Credit Rating = Fair) will buy a mobile or not. Show all intermediate probability calculations and analyze how each attribute contributes to the final decision.	12	3	3

Age Group	Income	Student	Credit Rating	Buys_Mobile
Youth	High	No	Fair	No
Youth	High	No	Excellent	No
Middle	High	No	Fair	Yes
Senior	Medium	No	Fair	Yes
Senior	Low	Yes	Fair	Yes

OR

4(B) Apply the concepts of entropy and information gain to the given dataset to calculate the values for each attribute (Altitude, Wind, Temperature, Humidity). Then, construct the root node of the decision tree by selecting the attribute with the highest information gain, and justify your selection with appropriate calculations. — 12 — 3 — 3

Altitude	Wind	Temperature	Humidity	Outcome
High	Low	Hot	High	Crash
Low	High	Cold	Low	Safe
Low	Low	Mild	High	Safe
Medium	High	Hot	Low	Crash
High	Low	Mild	Low	Safe
Medium	High	Mild	High	Crash
High	Low	Cold	High	Crash
Low	Low	Cold	Low	Safe
Medium	Low	Mild	Low	Safe
Low	High	Hot	High	Crash

5(A) (i) Discuss the Perceptron Learning Algorithm with example. — 6 — 4 — 2

(ii) Explain how a polynomial kernel (SVM) of degree 2 transforms non-linearly separable data into a separable form. — 6 — 4 — 2

OR

5(B) Explain the feedforward mechanism in a multilayer neural network using the following structure (no bias): — 12 — 4 — 2

- Inputs: x_0=4, x_1=7
- Hidden Layer 1 weights: [1, 1]and [-1,1]
- Hidden Layer 2 weights: [-2,1]and [1, 0]

Output layer weights: [1,-1]

6(A) Examine the suitability of K-Means and K-Medoids clustering algorithms for handling noisy datasets. — 6 — 5

OR

6(B) Evaluate the clustering outcomes produced by applying Complete-Linkage hierarchical clustering method to the given similarity matrix. — 12 — 5 — 5

	P1	P2	P3	P4	P5	P6
P1	1.0000	0.7895	0.1579	0.0100	0.5292	0.3542
P2	0.7895	1.0000	0.3684	0.2105	0.7023	0.5480
P3	0.1579	0.3684	1.0000	0.8421	0.5292	0.6870
P4	0.0100	0.2105	0.8421	1.0000	0.3840	0.5573
P5	0.5292	0.7023	0.5292	0.3840	1.0000	0.8105
P6	0.3542	0.5480	0.6870	0.5573	0.8105	1.0000

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 & Supplementary End Semester Examinations, May – 2026

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 is JVM?	1M	1	1
	ii)	Define type casting.	1M	1	1
	iii)	What is default constructor?	1M	2	1
	iv)	Define nested class.	1M	2	1
	v)	Define multi-level inheritance.	1M	3	1
	vi)	What is the difference between *extends* and *implements* keywords in Java?	1M	3	1
	vii)	What happens if an exception occurs in a Java program?	1M	4	2
	viii)	Why is BufferedInputStream efficient in file handling?	1M	4	2
	ix)	Why String is immutable in java?	1M	5	1
	x)	What is the purpose of *wait()* in multi-threading?	1M	5	1
2(A)	(i)	Discuss Principles of Object-Oriented Programming in detail.	6M	1	2
	(ii)	Write a Java program to find largest number among three integers.	6M	1	2
		OR			
2(B)		Explain about Java Looping Statements: *while* and *for* with suitable examples.	12M	1	2
3(A)	(i)	Discuss the use of this keyword in Java with suitable examples.	6M	2	2
	(ii)	Describe how private members of a class are accessed with suitable examples.	6M	2	2
		OR			
3(B)		Discuss polymorphism in Java and describe how method overloading works with suitable example.	12M	2	2
4(A)		Demonstrate types of Inheritance with suitable examples.	12M	3	3
		OR			
4(B)		Apply the concept of multiple inheritance for an interface *Drawable* with a method *draw()* and implement it in classes *Circle* and *Triangle*.	12M	3	3
5(A)	(i)	Develop a Java program to demonstrate exception handling using try, catch and finally	6M	4	3
	(ii)	Distinguish throw and throws in java exception handling.	6M	4	3
		OR			
5(B)		Demonstrate the concept of packages in java with suitable examples.	12M	4	3
6(A)	(i)	Analyze the different states of a thread life cycle and explain the transitions between each state.	6M	5	4
	(ii)	Implement a java program that illustrates concept of isAlive() and join() in multi- threading.	6M	5	4
		OR			
6(B)		Illustrate the differences between String and StringBuffer classes in Java with suitable examples.	12M	5	3

*****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 & Supplementary End Semester Examinations, May – 2026

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)	Provide a definition of Data Engineering.	1	1	1
	ii)	Differentiate between Data Engineering and Data Science	1	1	2
	iii)	What is data ingestion?	1	2	1
	iv)	Name two security considerations in data engineering.	1	2	1
	v)	What is Data Architecture? Give example.	1	3	1
	vi)	Classify different sources of data in source systems.	1	3	2
	vii)	Compare Data warehouse and Data Lake.	1	4	2
	viii)	Recall any two ingestion tools.	1	4	1
	ix)	Define the term Query Optimization	1	5	1
	x)	Comprehend Reverse ETL. How it differs from ETL?	1	5	2
2(A)		A company is struggling with inconsistent and siloed data across departments. Analyze the organization's current data maturity level and propose improvements using the Data Maturity Model.	12	1	4
		OR			
2(B)		A growing start-up faces challenges in managing increasing volumes of data. Analyze the limitations of traditional data handling approaches and recommend suitable data engineering solutions.	12	1	4
3(A)		Illustrate the Data Engineering Life Cycle with a neat diagram and real-world example.	12	2	3
		OR			
3(B)		Examine the role of Security, Data Management, DataOps, and Orchestration in the Data Engineering Life Cycle.	12	2	3
4(A)		Outline the principles of good data architecture and apply the principles to design data architecture for an enterprise.	12	3	3
		OR			
4(B)		Evaluate various data generation sources such as APIs, OLTP, OLAP, logs, and unstructured data.	12	3	3
5(A)		Compare and contrast different data ingestion frameworks (e.g., Apache NiFi, Kafka, Sqoop). In what scenarios is each best suited?	12	4	4
		OR			
5(B)		Analyse various storage systems and their role in data engineering.	12	4	4
6(A)		Describe the life cycle of a query and explain query optimization techniques.	12	5	2
		OR			
6(B)		Discuss data modeling and transformation techniques used in analytics and machine learning pipelines.	12	5	2

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 & Supplementary End Semester Examinations, May – 2026

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)	Define big data ecosystem.	1	1	1
	ii)	Differentiate between structured and unstructured data.	1	1	1
	iii)	Explain the semi-supervised learning? Give one example.	1	2	2
	iv)	Define the term 'overfitting' in machine learning model building.	1	2	1
	v)	State the CAP theorem and explain any one of its components.	1	3	1
	vi)	Differentiate between relational and NoSQL databases.	1	3	1
	vii)	What is Cypher? Mention its role in Neo4j.	1	4	1
	viii)	Write a Cypher query to match and return all nodes labelled 'Course'.	1	4	1
	ix)	What is dc.js and how is it used in data visualization?	1	5	1
	x)	Define MapReduce and its significance in data visualization.	1	5	1
2(A)	(i)	Explain the Data Science process in detail with reference to a real-world project charter and goal definition.	6	1	2
	(ii)	Discuss the defining goals and creating project charter in data science process.	6	1	2
		OR			
2(B)		Evaluate the importance of exploratory data analysis (EDA) in the Data Science process with suitable examples.	12	1	4
3(A)	(i)	List the applications of machine learning in Data science.	6	2	2
	(ii)	Explain the techniques for handling large datasets in Python. How can programming tips and sklearn tools improve model performance?	6	2	2
		OR			
3(B)		Demonstrate how a machine learning model can be built to predict malicious URLs. Include steps for feature engineering and validation.	12	2	2
4(A)		Illustrate the distribution of data storage and processing in a Hadoop ecosystem using a suitable case study.	12	3	2
		OR			
4(B)		Apply CAP theorem concepts to justify the use of a suitable NoSQL database for a disease diagnosis and profiling system.	12	3	3
5(A)		Write Cypher queries to model a LIBRARY MANAGEMENT SYSTEM in Neo4j with Book and Member nodes, BORROWED_BY relationships, and retrieve overdue books.	12	4	4
		OR			

5(B)	Analyze the role of text mining and analytics in Data Science using Python's NLTK and SQLite libraries with a Reddit posts classification example.	12	4	3
6(A)	Apply the complete Data Science process to a real-world scenario of your choice. Include data collection, preprocessing, modeling, and visualization.	12	5	4
	OR			
6(B)	Critically evaluate the steps involved in creating an interactive data dashboard using dc.js. What are its advantages over static visualizations?	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 & Supplementary End Semester Examinations, May – 2026

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)	While calculating the final bill, a decimal value is stored in an integer variable. Which type casting is required?	1M	1	2
	ii)	A billing application stores quantity as an integer and price as a decimal value. Which Java data types are appropriate?	1M	1	1
	iii)	Inside a constructor, the current object variable is referred to avoid naming conflicts. Which keyword is used?	1M	2	1
	iv)	A method defined inside a class is accessed only within the same class to protect sensitive data. What access level is used?	1M	2	2
	v)	A school stores student marks in a single list. Which type of array is suitable and why?	1M	3	2
	vi)	A subclass needs to call the constructor of its parent class. Which keyword is used?	1M	3	3
	vii)	A withdrawal amount exceeds balance in ATM software. Why is user-defined exception suitable here?	1M	4	4
	viii)	Two strings entered by the user are compared using ==. What problem may occur?	1M	4	4
	ix)	A thread moves from runnable to blocked state while waiting for I/O. Identify the thread state.	1M	5	2
	x)	A student database displays records in rows and columns. Which Swing component is used?	1M	5	3
2(A)		A traffic control department wants to simulate signal behavior using Java. a) Write a Java program using switch-case to display signal actions. b) Explain the use of control statements in the simulation. c) Identify tokens and classify them. d) Explain the importance of indentation and comments.	12M	1	3
		OR			
2(B)		A system validates user passwords. a) Write a Java program using loops and conditional statements. b) Use break and continue effectively. c) Explain tokens and statements used. d) Discuss programming style and readability	12M	1	4
3(A)		A math computation program performs the same operation on different data types. Explain method overloading, including its benefits and limitations, with examples.	12M	2	2
		OR			

3(B)	A large Java project needs controlled interaction between methods and classes. Explain access control in methods and discuss why method nesting is not supported in Java, along with alternatives.	12M	2	3
4(A)	A university stores marks of multiple students across semesters. Design a Java program using multi-dimensional arrays and explain your choice.	12M	3	3
	OR			
4(B)	A developer imports only specific classes instead of the entire package. Why is this recommended?	12M	3	5
5(A)	A file-handling program reads binary data from images. Explain byte s classes involved.	12M	4	2
	OR			
5(B)	A program converts character data from a file into readable format. Explain appropriate reader and writer classes.	12M	4	3
6(A)	A form validation system uses buttons, text fields, and labels. Explain how Swing handles user interaction.	12M	5	3
	OR			
6(B)	Design a GUI-based student management system integrating Swing and JDBC.	12M	5	6

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 & Supplementary End Semester Examinations, May – 2026

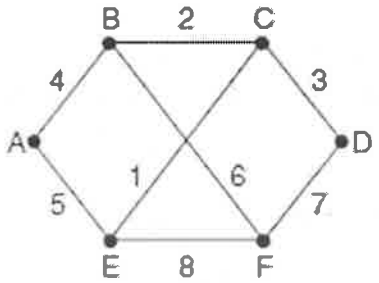
COMPUTER NETWORKS

(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)	Which transmission medium is immune to electromagnetic interference?	1	1	1
	ii)	A video packet is 1200 bytes. If network delay is 50 ms. What is the throughput in kbps?	1	1	2
	iii)	What is the primary function of the Data Link Layer?	1	2	1
	iv)	What is CSMA/CD?	1	2	1
	v)	Which protocol is responsible for delivering error messages at the Network Layer?	1	3	1
	vi)	A classless address is given as 167.199.170.82/28. Find the first address and last address?	1	3	1
	vii)	Explain the flow control in the Transport Layer.	1	4	1
	viii)	A TCP connection has a window size of 10 KB and an RTT of 200 ms. Calculate the throughput in Kbps	1	4	2
	ix)	What is the purpose of HTTP in web browsing?	1	5	1
	x)	What protocol is used for sending emails and how does it work?	1	5	1
2(A)	(i)	Give a brief description of the ISO Reference model.	6	1	2
	(ii)	What is transmission media? List the types of transmission media, list their advantages and disadvantages	6	1	2
		OR			
2(B)		A packet of size 1,000 bytes traverses **two routers** (three links total). Each link has a rate of 1.5 Mbps and distance of 1,000 km (propagation speed = 2×1082 \times 10^82×108 m/s). At each router, the average queuing delay = 2 ms **and** processing **delay** = 1 ms. Compute the total end-to-end delay.	12	1	3
3(A)	(i)	Explain the working of Go-back-N protocol.	6	2	2
	(ii)	Explain Stop-and-Wait and Sliding Window protocols	6	2	2
		OR			
3(B)		Given the following 16-bit words: 0110011001100110 0101010101010101 1000111100001100 Perform the 1's complement checksum calculation. Show all intermediate steps and write the final checksum value that would be transmitted with the data.	12	2	3
4(A)	(i)	How BGP work? Explain.	6	3	2

	(ii)	Distinguish between IPV4 and IPV6	6	3	2
		OR			
4(B)	(i)	Apply Link state routing algorithm and find a link state packets for all six routers 	12	3	3
5(A)	(i)	How can we establish the connection using TCP? Explain.	6	4	2
	(ii)	Explain the concept of error control in the Transport Layer	6	4	2
		OR			
5(B)		Describe the UDP protocol and demonstrate its functionality through a practical real-world communication scenario.	12	4	2
6(A)	(i)	What is HTTP? Explain its importance.	6	5	2
	(ii)	Explain the functions of the application layer.	6	5	2
		OR			
6(B)		Explain the E-mail and its protocols in details.	12	5	2

*****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 & Supplementary End Semester Examinations, May – 2026

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)	Which command checks if a file exists in shell scripting?	1	1	1
	ii)	How does Windows hybrid kernel combine microkernel and monolithic concepts?	1	1	2
	iii)	List the entries of process control block.	1	2	1
	iv)	List the process scheduling criteria.	1	2	1
	v)	Define mutual exclusion.	1	3	1
	vi)	Define semaphore and its type.	1	3	1
	vii)	What is the principle of locality of reference?	1	4	1
	viii)	What is internal fragmentation?	1	4	1
	ix)	What are the three main file allocation methods?	1	5	1
	x)	What is the role of OS in protection and security?	1	5	1
2(A)		Explain the various operating system services.	12	1	2
		OR			
2(B)		Design and explain a layered architecture for an operating system.	12	1	3
3(A)		A CPU scheduler uses the Shortest Job First (SJF) algorithm. Given five processes with known burst times, calculate the average waiting time and turnaround time. Explain why SJF minimizes average waiting time.	12	2	3
		OR			
3(B)		Write a detailed explanation of the process state transition diagram and explain how a process moves between states during its execution.	12	2	2
4(A)		Considering a system with five processes P0 through P4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t_0 following snapshot of the system has been taken.	12	3	4

Process	Allocation	Max	Available
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

What will be the content of the Need matrix? Is the system in a safe state? If yes, then what is the safe sequence?

OR

4(B)	A system uses semaphores to synchronize access to a shared file among multiple processes. Write a pseudocode solution that ensures mutual exclusion, and analyze how the semaphore values change during execution.	12	3	4
5(A)	Explain the concept of demand paging with a suitable example. Illustrate how pages are loaded into memory only when required and analyze how this technique improves memory utilization and system performance.	12	4	4
	OR			
5(B)	Consider the page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 3 with 4-page frames. Find number of page faults using Least Recently Used (LRU) Page Replacement Algorithm.	12	4	4
6(A)	Given the disk head position at 50, and the disk requests in the following order 98, 183, 37, 122, 14, 124, 65, 67. Compare the total head movements using FCFS (First-Come, First-Served) and SSTF (Shortest Seek Time First) algorithms.	12	5	3
	OR			
6(B)	Explain the various file allocation methods. Compare their efficient disk space utilization and accessibility.	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 & Supplementary End Semester Examinations, May– 2026

MACHINE LEARNING

(Artificial Intelligence & Machine Learning)

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)	Define bias-variance tradeoff	1	1	1
	iii)	What is cosine similarity?	1	2	1
	iv)	Define precision and recall.	1	2	1
	v)	What is entropy in decision trees?	1	3	1
	vi)	Define information gain.	1	3	1
	vii)	What is the kernel function?	1	4	1
	viii)	Define activation function.	1	4	1
	ix)	What is the elbow method?	1	5	1
	x)	Define linkage in hierarchical clustering.	1	5	1
2(A)	(i)	Explain the evolution of Machine Learning with key milestones.	6	1	3
	(ii)	Describe data preprocessing steps in Machine Learning	6	1	4
		OR			
2(B)		Describe the Machine Learning pipeline in detail with a neat diagram. Explain each stage including data collection, preprocessing, feature engineering, model training, evaluation, and deployment.	12	1	3
3(A)	(i)	Explain regression evaluation metrics including MSE, RMSE, MAE, and R-squared	6	2	2
	(ii)	Discuss the K-Nearest Neighbor Classifier.	6	2	3
		OR			
3(B)		Explain different distance measures used in KNN including Euclidean, Manhattan, Chebyshev, and Minkowski distances.	12	2	4
4(A)	(i)	Describe Random Forest algorithm and ensemble methods	6	3	2
	(ii)	Describe the CART algorithm for building classification and regression trees	6	3	3
		OR			
4(B)		Explain the C4.5 algorithm and its improvements over ID3. Discuss handling continuous attributes, missing values, and the gain ratio criterion. Compare with CART algorithm for regression trees.	12	3	4
5(A)	(i)	Describe Mercer's condition and kernel selection criteria. Demonstrate the kernel trick with an example.	6	4	3
	(ii)	Explain forward propagation, error computation, and gradient descent.	6	4	2
		OR			

5(B)		Describe the Perceptron learning algorithm and prove its convergence theorem.	12	4	2
6(A)	(i)	Compare Fuzzy C-Means clustering algorithm with K-Means. Explain the fuzzifier parameter, membership function update, and centroid calculation. Discuss advantages in overlapping clusters.	6	5	4
	(ii)	Explain DBSCAN density-based clustering algorithm. Describe core points, border points, and noise.	6	5	4
		OR			
6(B)		Explain the Expectation-Maximization algorithm for Gaussian Mixture Models.	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 & Supplementary End Semester Examinations, May – 2026

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.	1M	1	1
	ii)	Mention any one characteristic of a problem-solving agent.	1M	1	1
	iii)	Define Breadth-First Search.	1M	2	1
	iv)	Mention the role of evaluation functions.	1M	2	1
	v)	Define predicate logic.	1M	3	1
	vi)	What is Bayes' theorem?	1M	3	1
	vii)	What is the difference between forward and backward chaining?	1M	4	2
	viii)	What is reinforcement learning?	1M	4	1
	ix)	What is knowledge acquisition?	1M	5	1
	x)	What is the role of DART in expert systems?	1M	5	2
2(A)		Explain the structure of intelligent agents with examples.	12M	1	3
		OR			
2(B)		Identify and describe the type of agent suitable for each of the following applications: a) A thermostat b) A self-driving car c) A chess-playing program (Explain the reasoning behind your classification.)	12M	1	3
3(A)	(i)	Explain Breadth First Search (BFS) with an example.	6M	2	3
	(ii)	Explain heuristic search and hill climbing algorithm.	6M	2	2
		OR			
3(B)		Define a search problem for a robot navigating a 2×2 grid. Show how different uninformed strategies would behave.	12M	2	4
4(A)	(i)	Explain knowledge representation and its issues.	6M	3	2
	(ii)	Describe Bayes theorem and probabilistic inference.	6M	3	2
		OR			
4(B)	(i)	Using rules, represent the following knowledge and perform rule-based deduction: If a person is a student and has good grades, then the person is eligible for scholarship. John is a student and has good grades. (Write rules in IF-THEN format and show deduction process.)	12M	3	4
5(A)	(ii)	Write a short note on statistical and explanation-based learning.	12M	4	2
		OR			

5(B)	Using given facts, perform forward chaining and derive a conclusion: If a person is a citizen and over 18, they can vote. Alice is a citizen and 20 years old.	12M	4	3
6(A)	Write a note on heuristics and meta-knowledge in expert systems.	12M	5	3
	OR			
6(B)	Compare MYCIN and XCON expert systems. Describe their problem domains and knowledge representations.	12M	5	3

*****END*****

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

Question Paper Code: 23CSM106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Regular & Supplementary End Semester Examinations, May – 2026

ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

(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 balance factor.	1	1	1
	ii)	What is a directed graph?	1	1	1
	iii)	Name two algorithms to find MST	1	2	1
	iv)	What is a Minimum Spanning Tree	1	2	1
	v)	Define Travelling Salesperson Problem	1	3	1
	vi)	Name one application of Dynamic Programming.	1	3	1
	vii)	Define pruning in backtracking.	1	4	1
	viii)	What is FIFO branch and bound?	1	4	1
	ix)	Define decision problem.	1	5	1
	x)	What is Job Shop Scheduling?	1	5	1
2(A)	(i)	Illustrate different types of rotations in AVL trees.	6	1	2
	(ii)	Describe insertion operation in B-Trees.	6	1	2
		OR			
2(B)		Describe asymptotic notations (Big-O, Ω, Θ) with graphs and examples.	12	1	2
3(A)	(i)	Compare greedy method and dynamic programming.	6	2	3
	(ii)	Explain the general method of Greedy algorithm.	6	2	2
		OR			
3(B)		Explain the working of Merge Sort and apply it to sort the given data. State its time complexity.50, 40, 30, 20, 10, 60, 70	12	2	2
4(A)		Demonstrate the Bellman–Ford algorithm and compute shortest paths from the given source vertex A. Explain how the algorithm updates distance values in the presence of negative edge weights. GivenGraph: (A,B,4), (A,C,5), (B,C,−3), (C,D,4), (D,B,6)	12	3	3
		OR			
4(B)	(i)	Discuss applications of Dynamic Programming in optimization problems with examples.	12	3	3
5(A)		Find all subsets of the given set {10, 7, 5, 18, 12, 20, 15} that satisfy the target sum 35 using backtracking.	12	4	3
		OR			
5(B)		Solve the 8-Queens problem using backtracking. Show all steps and explain pruning.	12	4	3
6(A)	(i)	Differentiate between NP-Hard and NP-Complete problems.	6	5	3
	(ii)	Discuss the importance of NP problems in real-world applications.	6	5	2
		OR			
6(B)		Explain the concept of polynomial-time reduction. Illustrate with an example.	12	5	2

END

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 23CSN104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R23) Supplementary End Semester Examinations, May- 2026

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

Q.No		Question	Marks	CO	Bl
Q.1	i.	What are the different types of transmission modes?	1M	1	2
	ii.	Define multiplexing.	1M	1	1
	iii.	What is a datagram network?	1M	2	2
	iv.	Define parity check.	1M	2	1
	v.	Mention any two types of MAC protocols.	1M	3	2
	vi	What is NAT?	1M	3	1
	vii.	What is the use of TCP protocol?	1M	4	2
	viii	Define flow control.	1M	4	1
	ix.	Name any two file transfer protocols.	1M	5	1
	x.	What is TELNET used for?	1M	5	2
Q.2(A)		Design a layered network model for a hospital setup, mapping each TCP/IP layer with real-time components and justify the design.	12M	1	4
		OR			
Q.2(B)		Describe the OSI model with functions of each layer.	12M	1	3
Q.3(A)		Describe HDLC protocol frame format and operations.	12M	2	3
		OR			
Q.3(B)		Given a data bit stream 1101011011, compute the CRC using divisor 1011. Show each step of the computation.	12M	2	4
Q.4(A)		Explain Link State Routing and its advantages.	12M	3	3
		OR			
Q.4(B)		Explain Dijkstra's algorithm, and how compute the shortest path from node A to all other nodes with suitable example.	12M	3	4
Q.5(A)		Compare TCP and UDP in detail.	12M	4	3
		OR			
Q.5(B)		Simulate TCP congestion control (Slow Start and Congestion Avoidance) for the first 16 segments. Show the change in congestion window.	12M	4	4
Q.6(A)		Design a client-server chat system using socket programming. Specify the protocol flow and message formats.	12M	5	4
		OR			
Q.6(B)		Explain working of HTTP protocols with example.	12M	5	3

*** END***

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

Question Paper Code: 23CSN106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

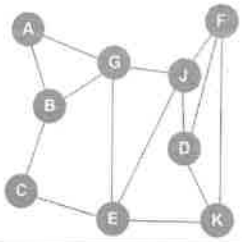
B. Tech II Year II Semester (R23) Supplementary End Semester Examinations, May – 2026

Advanced Data Structures and Algorithms Analysis

CSE (Networks)

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

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

Q.No.		Question	Marks	CO	BL
1.	i)	Classify different asymptotic notations	1	1	2
	ii)	State properties of AVL Trees	1	1	1
	iii)	List the applications of Greedy strategy	1	2	1
	iv)	State the complexity behaviour of Quick Sort	1	2	1
	v)	Distinguish between fractional and 0/1 knapsack problems	1	3	2
	vi)	Identify a limitation of Bellman-Ford algorithm	1	3	1
	vii)	Explain backtracking technique in problem solving	1	4	2
	viii)	Interpret the structure of a state space tree	1	4	2
	ix)	Explain NP-hard problem concept	1	5	2
	x)	State Cooks theorem	1	5	1
2(A)		Explain the concepts of Time Complexity and Space Complexity. Analyze how these measures help in selecting an efficient algorithm, using suitable examples.	12	1	2
		OR			
2(B)		Apply Breadth First Search (BFS) to traverse the given graph and determine the order of node visitation 	12	1	3
3(A)		Construct the Minimum Cost Spanning Tree using Prim's algorithm for the given graph and compute the total cost. Edges: (A,B,6), (A,D,1), (D,B,2), (B,C,5), (D,C,1)	12	2	3
		OR			
3(B)		Explain the working of Merge Sort and apply it to sort the given data. State its time complexity.50, 40, 30, 20, 10, 60, 70	12	2	2
4(A)		For a knapsack of capacity 6 and items with weights (2, 3, 4) and profits (1, 2, 5).Find the optimal subset of items that maximizes profit using Dynamic Programming. Show all steps in the table and how the solution is derived.	12	3	3
		OR			
4(B)		Apply the Floyd–Warshall algorithm to the given adjacency matrix and compute the shortest paths between all pairs of vertices.	12	3	3

$$\begin{bmatrix} 0 & 3 & \infty & 7 \\ 8 & 0 & 2 & \infty \\ 5 & \infty & 0 & 1 \\ 2 & \infty & \infty & 0 \end{bmatrix}$$

5(A)	Construct the solution for the Sum of Subsets problem using backtracking for S = {11, 13, 24, 7} and determine all valid subsets with sum 31.	12	4	3
	OR			
5(B)	Describe the Branch and Bound method and outline its strengths and weaknesses when applied to combinatorial problems.	12	4	2
6(A)	Describe the classes P, NP, NP-Hard, and NP-Complete problems and explain how they are related in terms of computational complexity.	12	5	2
	OR			
6(B)	Describe the Job Shop Scheduling problem with a suitable example.	12	5	2

*****END*****

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

Question Paper Code: 23CSN105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech II Year II Semester (R23) Supplementary End Semester Examinations, May – 2026

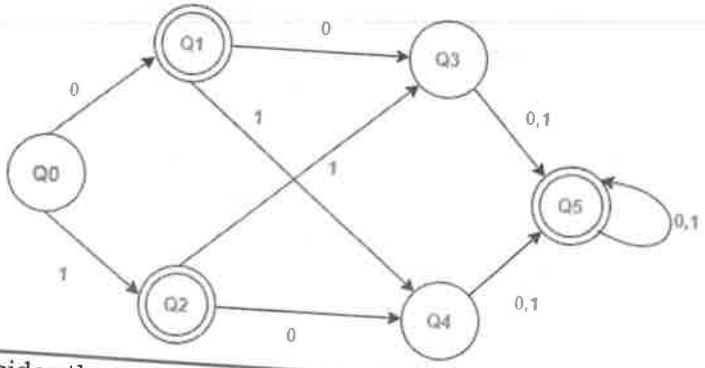
AUTOMATA THEORY AND COMPILER DESIGN

CSE (Networks)

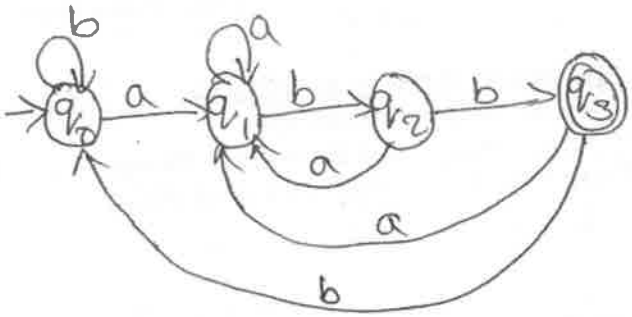
Time: 3Hrs **Max Marks: 70**

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

Q.No.		Question	Marks	CO	BL
1.	i)	Describe a transition function.	1	1	1
	ii)	Define accept state.	1	1	1
	iii)	State one identity rule of regular expressions.	1	2	1
	iv)	Define sentential form.	1	2	1
	v)	Justify whether PDA more powerful than a DFA.	1	3	1
	vi)	Define instantaneous description of PDA.	1	3	1
	vii)	Mention one advantage of using LEX.	1	4	1
	viii)	Give an example of a token.	1	4	1
	ix)	Define front-end of a compiler.	1	5	1
	x)	Define Register Allocation.	1	5	1
2(A)	(i)	Explain the Chomsky Hierarchy of languages with examples for each type.	6	1	2
	(ii)	Construct a DFA that accepts all strings over {0,1} that end with '01'.	6	1	3
2(B)		**OR**			
		Minimize the given DFA using the Table Filling Method and draw the minimized DFA.	12	1	3



3(A)		Consider the grammar- S → bB / aA A → b / bS / aAA B → a / aS / bBB			
	(i)	For the string w = bbaababa, find the Leftmost derivation, Rightmost derivation and Parse Tree.	6	2	3
	(ii)	Convert the regular expression (ab)*abb into a DFA.	6	2	3
3(B)		**OR**			
		Apply Arden's method, Convert the given DFA to Regular Expression.	12	2	3



4(A)		Define PDA. Construct a PDA for the language $L=\{a^n b^n \mid n \geq 0\}$ and explain its working.	12	3	3
		OR			
4(B)		Explain Turing Machine programming techniques with examples.	12	3	2
5(A)	(i)	Differentiate between a compiler and an interpreter with examples.	6	4	4
	(ii)	Explain the construction and working of Lex tool.	6	4	2
		OR			
5(B)		Describe the various phases of compiler and trace it with the program segment Position = initial + rate * 60.	12	4	2
6(A)		Construct the DAG for the following basic block.			
	(i)	d:= b * c e:= a+ b b:=b*c a=e-d	6	5	3
	(ii)	Illustrate about code optimization techniques.	6	5	2
		OR			
6(B)		Explain Implementations Issues in the design of Code Generator.	12	5	2

*****END*****