



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

L.B. Reddy Nagar :: Mylavaram-521 230 :: NTR Dist. :: A.P
Approved by AICTE, New Delhi. Affiliated to JNTUK, Kakinada

B.Tech. (V Semester) (R20) Semester End Examinations (Supplementary) – April 2026

REVISED TIME TABLE

REVISED

R20

Time : 10.00 AM to 01.00 PM

A.Y. : 2025-26

Branch	02-04-2026 (Thursday)	04-04-2026 (Saturday)	06-04-2026 (Monday)	07-04-2026 (Tuesday)	08-04-2026 (Wednesday)
				Open Elective - I	Program Elective - I
AI & DS	20CS12-Computer Networks	20AD04-Machine Learning	20AD05-Automata and Compiler Design	20ME81-Renewable Energy Sources	20CS24-Cloud Computing
ASE	20AE08-Aircraft Systems and Instruments	20AE09-Gas Dynamics	20AE10-Aircraft Structures-II	20EC81-Satellite Technology	20AE12-Finite Element Methods in Engineering
CE	20CE12-Design of Reinforced Concrete Structures	20CE13-Hydrology and Water Resources Engineering	20CE14-Environmental Engineering	20AD81 - Introduction to Artificial Intelligence 20ME81-Renewable Energy Sources	20CE15-Remote Sensing and Geographical Information Systems
CSE	20CS12-Computer Networks	20AD04-Machine Learning	20CS13-Theory of Computation	20ME81-Renewable Energy Sources 20CE82-Disaster Management	20CS16-Principles of Artificial Intelligence
CSE (AI & ML)	20CS12-Computer Networks	20AD04-Machine Learning	20CS13-Theory of Computation	20ME81-Renewable Energy Sources	20IT01 - Software Engineering
ECE	20EC09-Digital Communications	20EC10-Antennas and Wave Propagation	20EC11-Linear IC Applications	20IT81-OOP through JAVA 20IT84 - Cyber Security and Digital Forensics	20EC14-Data Communication and Computer Networks
EEE	20EE12-Power Systems-II	20EE13-Electrical Machines-II	20EE14-Power Electronics	20AD81 - Introduction to Artificial Intelligence 20IT81-OOP through JAVA	20EE16-Linear and Digital IC Applications 20EE17-Energy Conservation and Management
IT	20CS12-Computer Networks	20AD04-Machine Learning	20CS13-Theory of Computation	20EC81-Satellite Technology 20ME81-Renewable Energy Sources	20CS16-Principles of Artificial Intelligence 20IT02 - Internet of Everything
ME	20ME10-IC Engines and Gas Turbines	20ME11-Machine Tools and Metrology	20ME12-Design of Machine Elements-I	20EE84 - Electric Vehicles 20AD81 - Introduction to Artificial Intelligence 20IT81-OOP through JAVA	20ME14-Robotics

Note: Any omissions or clashes in the time table may please be informed to the Controller of Examinations immediately.

Date: 17 MAR 2026

CONTROLLER OF EXAMINATIONS

PRINCIPAL

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B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

20CS12-COMPUTER NETWORKS

(AI & DS, CSE, CSE (AI & ML) & IT)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Discuss the functionalities of different layers in OSI model with the help of diagram.	7M	CO1	L2
(b)	Describe various guided transmission media with a neat sketch.	7M	CO1	L2
(OR)				
2(a)	Explain about ethernet frame format.	7M	CO1	L2
(b)	Discuss about Virtual Lan with neat diagram.	7M	CO1	L2
3(a)	Define framing and explain character stuffing and bit stuffing.	7M	CO2	L2
(b)	Calculate 7-bit Hamming code word received by a receiver is 1011011. Assuming the even parity, state whether the received word is correct or wrong. If wrong locate the bit in the error.	7M	CO2	L3
(OR)				
4(a)	Discuss about CSMA/Collision detection.	7M	CO2	L2
(b)	Discuss about simplest protocol and stop and wait ARQ.	7M	CO2	L2
5(a)	Discuss about Network Address Translation.	7M	CO3	L2
(b)	A block of addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. What is the first address in the block? What is last address in the block? Identify the number of addresses assigned to that organization.	7M	CO3	L3
(OR)				
6(a)	Discuss about IPV4 header format.	7M	CO3	L2
(b)	Describe operations of BOOTP AND DHCP.	7M	CO3	L2
7(a)	A client transmits data to server using connection orientated protocol. Name the protocol. Explain about protocol connection Termination.	7M	CO4	L2
(b)	Discuss about Token bucket.	7M	CO4	L2
(OR)				
8(a)	Discuss about closed-loop policies to prevent congestion control.	7M	CO4	L2
(b)	Discuss about services of user datagram protocol.	7M	CO4	L2
9(a)	Discuss in brief about FTP.	7M	CO5	L2
(b)	Define World Wide Web and discuss its use.	7M	CO5	L2
(OR)				
10(a)	Explain in brief about the formats of HTTP request and Response messages.	7M	CO5	L2
(b)	Explain about e-mail with architecture.	7M	CO5	L2

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B.Tech. (V Semester) Regular/Supplementary Examinations

**20CE12-DESIGN OF REINFORCED CONCRETE STRUCTURES
(CE)**

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1.	A R C beam of 230mm X 450mm effective depth is used over an effective span of 5 m. It is subjected to a U D L of 12 kN/m inclusive of it's self-weight. Design the reinforcement take allowable stress in concrete & steel as 7N/mm ² & 140N/mm ² Sketch the details Using working stress method.	14M	CO2	L3
(OR)				
2(a)	Explain the terms under and over reinforced sections in RCC Design.	4M	CO1	L2
(b)	Design a doubly reinforced beam 300mm wide & 500mm deep of M20 grade concrete to resist a ultimate moment of 150 kNm using Fe 415 bars, M20 Grade Concrete & sketch the details.	10M	CO2	L3
3.	A simply supported beam of 230 mm wide & 500mm effective depth carries an U D L of 80kN/m including self-weight over an effective span of 6 m Design shear reinforcement in the form of vertical stirrups. Assume M20 concrete Fe 250 grade steel assume width of support as 230 mm.	14M	CO3	L3
(OR)				
4.	A rectangular beam of 230 mm wide & 450 mm effective depth is reinforced with 3 bars 16 mm dia at supports Design shear reinforcement if it carries a shear force of 60 kN at service Use M20 concrete Fe 415 steel. Also design nominal shear stirrups at mid span.	14M	CO3	L3
5.	Design a R.C.C slab for a room having inside dimensions 3 m X 5 m. The thickness of supporting wall is 230 mm. Assume slab simply supported at ends. Take M20 grade concrete and Fe 415 steel.	14M	CO4	L3
(OR)				
6.	Design a R.C.C slab having inside dimensions 3 m X 8 m. The super imposed load may be taken as 3 kN/m ² Use M20 mix & Fe 415 steel.	14M	CO4	L3
7.	Design a rectangular column of 4m unsupported length held in position and restrained direction at both ends to carry an axial load of 1200 kN. Take M20 grade concrete and Fe 415 steel.	14M	CO3	L3
(OR)				
8.	Design a short column for following data Size of column: 400 mm X 400 mm Ultimate load carrying capacity : 1800 kN $M_{UX} = 160 \text{ kN.m}$ $M_{UY} = 120 \text{ kN.m}$ Take M20 grade concrete and Fe 415 steel	14M	CO3	L3
9.	An RCC column of size 350mm X 350mm reinforced with 8-16mm dia. Bars carries a characteristic load of 1000kN. The allowable bearing pressure on soil is 170kN/m ² . Design an isolated square pad footing. The materials are grade M25 concrete and HYSD reinforcement of Grade Fe 415 for both the column and footing.	14M	CO4	L3
(OR)				
10.	An RCC column of size 400mm X 400mm reinforced with 6-20mm dia. Bars carries a characteristic load of 900kN. The allowable bearing pressure on soil is 220kN/m ² . Design an isolated square sloped footing. The materials are grade M20 concrete and HYSD reinforcement of Grade Fe 415 for both the column and footing.	14M	CO4	L3

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B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20EC09-DIGITAL COMMUNICATIONS

(ECE)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Explain the types of quantization with neat diagrams.	7 M	CO1	L2
(b)	A Television Signal with of 4.2MHz is transmitted using PCM. The number of quantization levels is 512. Obtain, (i)Code word Length (ii) Transmission bandwidth (iii) Final Bit rate (iv) SNR.	7 M	CO2	L3
(OR)				
2(a)	Examine various steps involved in pulse code modulation with neat block diagram.	7 M	CO2	L2
(b)	Derive an expression for SNR in Delta Modulation.	7 M	CO2	L3
3.	Illustrate Gram-Schmidt orthogonalization procedure and derive general equation for basis functions.	14 M	CO3	L2
(OR)				
4(a)	Examine the response of bank of correlators to noisy input.	7 M	CO3	L2
(b)	Examine the concept of probability error and derive an expression for it.	7 M	CO3	L2
5(a)	Describe the generation and detection of binary ASK (BASK) modulation system along with merits and demerits.	7 M	CO2	L2
(b)	Derive an expression for probability of error of BPSK receiver assuming the channel is Gaussian.	7 M	CO3	L3
(OR)				
6(a)	Apply digital modulation scheme with necessary diagrams and waveforms to generate and detect coherent binary frequency shift keying (BFSK) signal transmission and also draw the constellation diagram.	7 M	CO2	L3
(b)	Apply the concept of Euclidean distance in noisy environment to derive the expression for probability of error for coherent binary FSK receiver.	7 M	CO3	L3
7(a)	Discuss in detail about the following (i) Information rate (ii) Mutual Information.	7 M	COC ₄	L2
(b)	Construct the Huffman code and find the encoded bit sequence for the given message "BALL IS BAD".	7 M	CO4	L3
(OR)				
8(a)	Show that $H(X,Y) = H(X) + H(Y/X)$.	7 M	CO4	L3
(b)	An analog signal is bandlimited to B Hz, sampled at the Nyquist rate, and the samples are quantized into 4 levels. The quantized levels Q1,Q2,Q3 and Q4 (Messages) are assumed independent and occur with probabilities $p_1=p_4=1/8$ and $p_2=p_3=3/8$. Find the information rate of the source.	7 M	CO4	L3
9(a)	Consider (7,4) hamming code with generator matrix shown below. $G = \begin{bmatrix} 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$	7 M	CO4	L3
	(i) Find the corresponding parity-check matrix. (ii) Generate all possible code words.			
(b)	Develop the encoder for (7,4) cyclic hamming code generated by polynomial $g(x) = 1+x+x^3$ also determine the contents of shift register for the message sequence [1 0 0 1].	7 M	CO4	L3
(OR)				
10(a)	Examine the time domain and transform domain approach of convolutional coding with an example.	7 M	CO4	L2
(b)	Obtain the code words for (7,4) cyclic code with generator polynomial, $g(x) = x^3+x^2+1$ in the non-systematic form for the given messages [1 0 1 1] and [1 1 0 1].	7 M	CO4	L3

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B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20EE12-POWER SYSTEMS-II

(EEE)

Time : 3 hours

Max. Marks :70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Derive ABCD parameters of medium transmission lines in Nominal-T method.	7M	CO1	L3
(b)	Calculate the following parameters for a single circuit transmission line delivering a load of 50 MVA at 110 kV and p.f. 0.8 lagging : (i) sending end voltage (ii) sending end current (iii) sending end power (iv) efficiency of transmission. If $A=D=0.98\angle 3^\circ$, $B=110\angle 75^\circ$ ohm, $C=0.0005\angle 80^\circ$ siemen.	7M	CO1	L3
(OR)				
2(a)	Derive the power flow equations through the transmission line.	7M	CO1	L3
(b)	A 3-phase, 50Hz, 150 km line has a resistance, inductive reactance and capacitive shunt admittance of 0.1Ω , 0.5Ω and 3×10^{-6} S per km per phase. If the line delivers 50 MW at 110 kV and 0.8 p.f. lagging, determine the sending end voltage and current. Assume a nominal- π circuit for the line.	7M	CO1	L3
3(a)	Discuss the voltage control using shunt capacitors in the transmission lines.	7M	CO2	L2
(b)	Describe the loadability characteristics of transmission lines.	7M	CO2	L2
(OR)				
4(a)	Discuss the voltage control using series capacitors in the transmission lines.	7M	CO2	L2
(b)	Describe the operation of radial line with asynchronous load.	7M	CO2	L2
5(a)	Derive the change of per unit quantities from old base to new base.	7M	CO3	L3
(b)	A generator is connected through a transformer to a synchronous motor. The sub-transient reactances of generator and motor are 0.15 and 0.35 p.u respectively. The leakage reactance of the transformer is 0.1p.u. All the reactances are calculated on a common base. A three-phase fault occurs at the terminals of the motor when the terminal voltage of the generator is 0.9 p.u. The output current of generator is 1 p.u. and 0.8 pf leading. Find the sub-transient current in p.u. in the fault, generator and motor. Use the terminal voltage of generator as reference vector.	7M	CO3	L3
(OR)				

20EE12-POWER SYSTEMS-II

6(a)	Derive the reactances when a short-circuit occurs on the alternator on no-load.	7M	CO3	L3
(b)	Outline the short circuit capacity of a bus in power system.	7M	CO3	L2
7(a)	Derive the sequence impedances network of LL fault with fault impedance.	7M	CO3	L3
(b)	The line currents in amperes in phases a , b and c respectively are $(500 + j150)$, $(100 - j600)$ and $(-300 + j600)$ referred to the same reference vector. Find the symmetrical component of currents.	7M	CO3	L3
(OR)				
8(a)	Derive the equations of transformation of symmetrical components.	7M	CO3	L3
(b)	A 3-phase generator is rated 25 MVA, 13.2 kV and $X_1 = 0.2$ pu; $X_2 = 0.3$ pu and $X_0 = 0.10$ pu. The neutral is solidly grounded. A line-to-line fault occurs on phases B and C of the generator. Calculate : (i) I_b in amperes, (ii) I_c in amperes, (iii) V_{AB} in volts, (iv) V_{BC} in volts and (v) V_{CA} in volts.	7M	CO3	L3
9(a)	Discuss the essential qualities of protection in power system.	7M	CO4	L2
(b)	Illustrate the operation of mho relay on R-X diagram.	7M	CO4	L2
(OR)				
10(a)	Classify the circuit breakers based on voltage, location, design and medium.	7M	CO4	L2
(b)	Describe the principle of operation of air-blast circuit breaker.	7M	CO4	L2

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B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20ME10-IC ENGINES AND GAS TURBINES

(ME)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Differentiate between the two stroke and four stroke IC engines.	7M	CO1	L2
(b)	Elucidate the working principle of four stroke SI engine with neat sketch.	7M	CO1	L2
(OR)				
2(a)	Enlist the functions of fuel injector.	7M	CO1	L1
(b)	Describe the working of a simple carburetor with suitable sketch.	7M	CO1	L2
3(a)	Illustrate the stages of combustion in CI engines.	7M	CO2	L2
(b)	Elucidate the knocking phenomenon in SI engines with neat sketch.	7M	CO2	L2
(OR)				
4(a)	List the requirements of combustion chamber for CI engines.	7M	CO2	L1
(b)	Describe the construction and functioning of pre-combustion chamber with neat sketch.	7M	CO2	L2
5(a)	List the methods to improve the performance of CI engines.	7M	CO3	L1
(b)	An engine with 80% mechanical efficiency develops a brake power of 30 kW. Estimate its Indicated power and frictional power. If frictional power is assumed to be constant, what will be the mechanical efficiency at half load?	7M	CO3	L3
(OR)				
6(a)	Define variable valve technology and list the key components involved.	7M	CO3	L1
(b)	Elaborate the working of electric vehicle with neat sketch.	7M	CO3	L2
7(a)	Illustrate the working of simple constant pressure closed cycle gas turbines.	7M	CO4	L2
(b)	Elucidate the concept of reheating in the gas turbine cycle and how it contributes to improving efficiency.	7M	CO4	L1
(OR)				
8(a)	List the merits and demerits of gas turbines.	7M	CO4	L1
(b)	In a Brayton cycle the pressure ratio is 5 and maximum and minimum temperatures are 800K and 310K. Find (i) net work output per kg of air (ii) efficiency of the cycle.	7M	CO4	L3
9(a)	Enlist the different types of emissions produced by gas turbines.	7M	CO5	L1
(b)	Illustrate the working of turbojet engine.	7M	CO5	L2
(OR)				
10(a)	Discuss the criteria of performance considered in aircraft propulsion analysis.	7M	CO5	L2
(b)	Enlist the merits and demerits of turbo prop engine.	7M	CO5	L1

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B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20AD04-MACHINE LEARNING
(AI&DS,CSE,CSE(AI&ML) and IT)

9.22 ✓

Time : 3 hours

Max. Marks: 70

Answer one question from each unit

All questions carry equal marks

All questions carry equal marks									
Q.No	Questions						Marks	CO	BL
1(a)	Illustrate supervised learning with neat diagram.						7M	CO1	L2
(b)	Elaborate activities in machine learning.						7M	CO1	L2
(OR)									
2(a)	Discuss different types of data that we deal with in any machine learning task.						7M	CO1	L2
(b)	Illustrate unsupervised learning with neat diagram.						7M	CO1	L2
(OR)									
3(a)	Explain different ways to measure the performance of a supervised learning model.						7M	CO2	L2
(b)	Differentiate lazy learner and eager learner.						7M	CO2	L2
(OR)									
4(a)	Describe the process of k-fold cross validation method with a neat diagram.						7M	CO2	L2
(b)	Write short notes on Feature transformation and feature subset selection.						7M	CO2	L2
(OR)									
5(a)	Discuss the regression analysis assumptions.						7M	CO3	L2
(b)	Write the procedure to derive the linear equation for simple linear regression model with suitable data.						7M	CO3	L3
(OR)									
6(a)	Explain the importance of multiple linear regression analysis in predictive modeling.						7M	CO3	L2
(b)	Fit the linear equation for the given data using the simple linear regression. Find the R ² value for the given dataset						7M	CO3	L3
	X	1	2	3	4	5			
	Y	40	63	30	49	60			
(OR)									
7(a)	Describe the classification learning steps.						7M	CO4	L2
(b)	Expand the term kNN. Devise an algorithm that can work with 'k' nearest neighbors.						7M	CO4	L2
(OR)									
8(a)	Discuss the Random Forest model with a neat diagram.						7M	CO4	L2
(b)	List out the strengths, weaknesses, and applications of SVM.						7M	CO4	L2
(OR)									
9(a)	Describe the role of a reward function in reinforcement learning.						7M	CO5	L2
(b)	Discuss the stacking with neat diagram.						7M	CO5	L2
(OR)									
10(a)	Describe AdaBoost algorithm with block diagram.						7M	CO5	L2
(b)	Illustrate Bagging with neat diagram.						7M	CO5	L2

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B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

20AE09-GAS DYNAMICS

(ASE)

9.22

Time : 3 hours

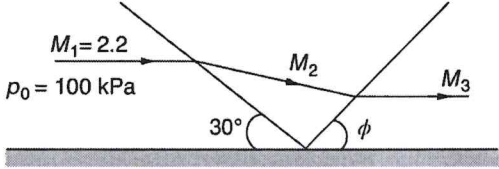
Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Classify flows based on the Mach number.	4M	CO1	L2
(b)	Define compressibility and derive the limiting condition for compressibility in terms of Mach number.	10M	CO1	L3
(OR)				
2(a)	Ambient air at an altitude of 5000 m above the sea level enters the engine of an aircraft at 450 kmph. If the air flow rate through the engine is 25 kg/s determine the diameter of the inlet to the engine.	7M	CO1	L4
(b)	The conditions of an airstream at entry to a duct are 1 bar, 300 K and Mach 1.3. If the Mach number at the exit of the duct is 0.6, determine for isentropic flow the temperature and the velocity of air the duct exit.	7M	CO1	L4
3(a)	By using gas tables, identify the ratio of back pressure to stagnation pressure $\left(\frac{p_b}{p_0}\right)$ required for a convergent nozzle to deliver the flow with Mach number (i) 0.45 (ii) 0.84.	4M	CO2	L2
(b)	Derive the following equation and write its implications. $\left(\frac{A}{A^*}\right)^2 = \frac{1}{M^2} \left[\frac{2}{\gamma+1} \left(1 + \frac{\gamma-1}{2} M^2 \right) \right]^{\frac{\gamma+1}{\gamma-1}}$	10M	CO2	L3
(OR)				
4(a)	Consider isentropic flow through a convergent-divergent nozzle with exit-to-throat ratio of 2. The reservoir pressure and temperature are 1 atm and 288 K, respectively. Calculate the Mach number, pressure and temperature at both the throat and the exit for the cases (i) the flow is supersonic at the exit under correction expansion condition (ii) the flow is subsonic throughout the nozzle except at the throat, where $M = 1$.	7M	CO2	L4
(b)	A convergent-divergent nozzle discharges air from a reservoir at 1MPa to a surrounding at 100 kPa. The throat and exit areas of the nozzle are 8 cm ² and 13.5 cm ² , respectively. Determine the exit Mach number.	7M	CO2	L4
5(a)	Consider flows of air and helium. For each case, the flow speed of the gas is 1500 m/s, and the static temperature of the gas is 288 K. Calculate the ratio of the static pressure downstream of a normal shock wave (P_2), to the static pressure upstream of the shock wave (P_1). Also, indicate which gas will result in a stronger shock. For air, take $R = 287 \text{ J/kg-K}$, $\gamma=1.4$. For Helium $R = 2079 \text{ J/kg-K}$, $\gamma=1.67$.	7M	CO3	L4
(b)	Air from a reservoir at 350 K and 500 kPa, flows through a converging-diverging nozzle. The throat area is 3 cm ² . A normal shock appears, for which the Mach number behind the shock wave is 0.6405. Calculate (i) area where the shock appears (ii) pressure and temperature downstream of the shock wave.	7M	CO3	L4
(OR)				

20AE09-GAS DYNAMICS

6(a)	Identify the shock wave angle (β) for the supersonic flow over a compression corner with an angle of $\theta = 20^\circ$. Take (i) $M_1 = 2.5$ (ii) $M_1 = 3.0$ (iii) $M_1 = 3.5$ (iv) $M_1 = 4.0$	4M	CO3	L4
(b)	An oblique shock is reflected from a solid wall, as shown in Figure below. Calculate the Mach number and pressure downstream of the reflected shock. Also, calculate the angle ϕ made by the reflected shock with the wall. Assume the medium to be air. 	10M	CO3	L4
7(a)	How does friction affect the flow properties for compressible flow through a constant area duct. Assume that the flow is entering the duct with supersonic Mach number.	4M	CO4	L2
(b)	Air flows adiabatically through a pipe of 36.6 m long and 7.5 cm in diameter. At the entry $p = 621$ kPa, $T = 20^\circ\text{C}$, and $V = 69$ m/s. The flow chokes at the end of the pipe. Calculate the average friction factor and pressure at the exit of the pipe. Assume $\gamma = 1.4$ and $R = 287$ J/kg-K.	10M	CO4	L4
(OR)				
8(a)	How does the maximum heat transfer alter the flow properties of a supersonic flow through a constant area duct? Neglect the frictional effects.	4M	CO4	L2
(b)	Air enters a constant-area duct at $p_1 = 90$ kPa, $V_1 = 520$ m/s, and $T_1 = 558^\circ\text{C}$. It is then cooled with negligible friction until it exits at $p_2 = 160$ kPa. Estimate V_2 , T_2 and total amount of cooling in kJ/kg.	10M	CO4	L4
9(a)	Obtain the expression for pressure coefficient for a linearized subsonic flow over a two-dimensional profile.	7M	CO5	L3
(b)	For a given airfoil, the critical Mach number is 0.8. Calculate the ratio of minimum pressure on the airfoil to freestream pressure when the freestream Mach number is 0.8.	7M	CO5	L2
(OR)				
10.	At a given point on the surface of an airfoil, the pressure coefficient is -0.3 at very low speeds. Calculate the coefficient of pressure (C_p) at this point if the freestream Mach number is (i) 0.35 (ii) 0.45 (iii) 0.55 (iv) 0.8.	14M	CO5	L4

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B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

20CE13-HYDROLOGY AND WATER RESOURCES ENGINEERING
(CE)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions										Marks	CO	BL
1(a)	Describe the Thiessen Polygon method to determining the average depth of rainfall over an area.										7M	CO1	L1
(b)	The analysis of a storm yielded the following information regarding isohyets. Calculate the average depth of rainfall.										7M	CO2	L3
	Isohyet interval in mm	85-75	75-65	65-55	55-45	45-35							
	Area in km ²	125	236	264	175	150							
(OR)													
2(a)	Describe the principle of working of float type recording raingauge with a neat sketch.										7M	CO1	L1
(b)	Discuss the various factors affecting infiltration.										7M	CO1	L2
(OR)													
3(a)	Describe briefly how the total precipitation is transformed into the total runoff.										7M	CO1	L1
(b)	Derive an expression for the steady state discharge of well fully penetrating into an unconfined aquifer.										7M	CO1	L2
(OR)													
4(a)	Describe recuperation test for an open well. Derive the equation for specific yield or specific capacity of the well in this test.										7M	CO1	L1
(b)	In an confined aquifer of 8 m thick, a 10 cm diameter well is pumped at a constant rate of 100 lit/minute. The steady state drawdown observed in two wells located at 10 m and 50 m distances from the centre of the well are 3 m and 0.05 m respectively. (i) Compute the transmissivity and the hydraulic conductivity of the aquifer. (ii) Determine the radius of influence and the drawdown in the well.										7M	CO3	L3
(OR)													
5(a)	List out limitations and uses of Unit Hydrograph.										7M	CO1	L1
(b)	Given below are the ordinates of a 3 h unit hydrograph for a catchment, calculate the ordinates of the flood hydrograph due to a rainfall excess of 3.5 cm occurring in 3 h. Assume base flow to be uniform at 10 m ³ /s.										7M	CO3	L3
	Time (h)	0	3	6	9	12	15	18	21	24			
	Ordinates of 3-h UH (m ³ /s)	0	25	50	60	36	25	16	8	0			
(OR)													
6(a)	Distinguish between (i) Surface runoff and subsurface runoff. (ii) direct runoff and base flow.										7M	CO1	L2

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(b)	The following are the ordinates of 4-h unit hydrograph. Derive the ordinate of a 12-hour unit hydrograph and plot the same by s-curve method.									7M	CO3	L3	
	Time (h)	0	4	8	12	16	20	24	28				32
	Ordinates of 4-h UH (m ³ /s)	0	15	30	40	65	35	25	10				0
7(a)	Discuss in briefly the benefits and ill-effects of irrigation.									7M	CO4	L2	
(b)	A loam soil has field capacity of 22% and wilting coefficient of 10%. The dry unit weight of soil is 15 kN/m ³ . If the root zone depth is 70 cm, determine the storage capacity of the soil. Irrigation water is applied when moisture content falls to 14 %. If the water application efficiency is 75 %, determine the water depth required to be applied in the field.									7M	CO5	L3	
(OR)													
8(a)	Define the terms 'duty' and 'delta'. Derive a relationship between the two.									7M	CO4	L1	
(b)	Discuss the various Irrigation efficiencies in Irrigation engineering.									7M	CO4	L2	
9(a)	Classify the canals based on the canal discharge and discuss briefly each one.									7M	CO4	L2	
(b)	Design an irrigation canal to carry a discharge of 14m ³ /s. Assume N = 0.0225, m = 1 and (B/D) = 5.7 (Use Kennedy's theory).									7M	CO5	L3	
(OR)													
10(a)	Compare Kennedys and Lacey's silt theories.									7M	CO4	L2	
(b)	Design a concrete lined channel to carry a discharge of 200 m ³ /s at a slope of 1 in 5000. The side slopes of the channel are 1.5 : 1. The value of Manning's N may be taken as 0.015. (Trapezoidal section with circular bottom).									7M	CO5	L3	

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B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

20EC10-ANTENNAS AND WAVE PROPAGATION

(ECE)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Show that radiation resistance of half wave dipole antenna is 73Ω .	7M	CO1	L3
(b)	Discuss the following antenna parameters (i) Horizontal pattern (ii) Side lobe level (iii) Beam efficiency (iv) Beam area	7M	CO1	L2
(OR)				
2(a)	The loss resistance of antenna is 25Ω . Calculate its radiation resistance, if the power gain is 30 and directivity is 42.	7M	CO1	L3
(b)	Determine the relation between directivity and effective aperture.	7M	CO1	L3
3(a)	Describe the characteristics of broadside and end fire arrays.	7M	CO2	L2
(b)	Analyze array of N point sources excited with currents of same magnitude and equal phase.	7M	CO2	L4
(OR)				
4(a)	Discuss how the side lobe levels can be reduced using the binomial array.	7M	CO2	L2
(b)	Use pattern multiplication method to draw resultant radiation pattern for array of 8 point sources.	7M	CO2	L3
5(a)	Differentiate between resonant and non resonant antennas.	7M	CO3	L2
(b)	Describe constructional features and characteristics of rhombic antenna.	7M	CO3	L2
(OR)				
6(a)	Examine the characteristics of helical antenna in normal mode.	7M	CO3	L2
(b)	Determine the physical dimensions of Yagi-Uda antenna with 6 elements to operate at 20MHz.	7M	CO3	L3
7(a)	Illustrate the concept of transmitting and receiving mode lens antennas with neat diagrams.	7M	CO4	L4
(b)	Summarize different types of horn antennas with related diagrams.	7M	CO4	L2
(OR)				
8(a)	Use Friis transmission equation for measurement of gain using 3 antennas method.	7M	CO4	L3
(b)	Illustrate the measurement of radiation pattern of an antenna with neat block diagram.	7M	CO4	L2
9(a)	Demonstrate the radio wave propagation through ionosphere.	7M	CO5	L3
(b)	Summarize the characteristics of D,E,F layers in the ionosphere.	7M	CO5	L2
(OR)				
10(a)	Categorize different types of wave propagation in the atmosphere.	7M	CO5	L2
(b)	Describe the fundamental equation of space wave propagation with related equations.	7M	CO5	L2

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B.Tech. (V Semester) Regular/Supplementary Examinations

20EE13-ELECTRICAL MACHINES-II

(EEE)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

All questions carry equal marks																																
Q.No	Questions									Marks	CO	BL																				
1(a)	Illustrate the principle of operation of 3-phase Induction Motor.									7M	CO1	L2																				
(b)	A 3-phase, 6 pole, 50 Hz, induction motor has a slip of 1% at no-load and 3% at full load. Determine (i) Synchronous speed (ii) No-load speed (iii) Full load speed (iv) Frequency of rotor current at standstill (v) Frequency of rotor current at full load.									7M	CO1	L3																				
(OR)																																
2(a)	Distinguish between slip-ring and squirrel cage Induction Motor.									7M	CO1	L2																				
(b)	A 3-phase, 5 HP, 208V, 60 Hz, Induction Motor runs at 1746 rpm when it delivers rated output power. Determine (i) Number of poles (ii) slip at full load (iii) frequency of rotor current.									7M	CO1	L3																				
3.	A 3-phase, 6-pole, 50Hz Y-connected Induction Motor has the following test results. No-load test : 400V,9A,1250W Short-circuit test: 200V, 50A, 6930W. Draw Circle diagram, determine slip, power factor and efficiency.									14M	CO1	L3																				
(OR)																																
4(a)	Illustrate the various power stages of 3-phase Induction Motor.									7M	CO1	L2																				
(b)	Describe the operation of Induction Motor as Generator.									7M	CO1	L3																				
5(a)	Describe the double field revolving theory in single phase Induction Motor.									7M	CO2	L2																				
(b)	Illustrate the working of split phase Induction Motor.									7M	CO2	L2																				
(OR)																																
6(a)	Describe the working of shaded pole induction motor.									7M	CO2	L2																				
(b)	Discuss the operation of capacitor start Induction Motor.									7M	CO2	L2																				
7(a)	Describe the constructional details of 3-phase Synchronous Generator.									7M	CO3	L2																				
(b)	Discuss the importance of Synchronous Machine constants.									7M	CO3	L2																				
(OR)																																
8.	A 3.5 MVA, Y-connected alternator rated at 4160 volts at 50-Hz has the open-circuit characteristic given by the following data: <table><tr><td>Field Current (A)</td><td>50</td><td>100</td><td>150</td><td>200</td><td>250</td><td>300</td><td>350</td><td>400</td><td>450</td></tr><tr><td>EMF (V)</td><td>1620</td><td>3150</td><td>4160</td><td>4750</td><td>5130</td><td>5370</td><td>5550</td><td>5650</td><td>5750</td></tr></table> A field current of 200 A is found necessary to circulate full-load current on short-circuit of the alternator. Calculate the full-load voltage regulation at 0.8 p.f. lagging by using synchronous impedance method. Neglect resistance.									Field Current (A)	50	100	150	200	250	300	350	400	450	EMF (V)	1620	3150	4160	4750	5130	5370	5550	5650	5750	14M	CO3	L3
Field Current (A)	50	100	150	200	250	300	350	400	450																							
EMF (V)	1620	3150	4160	4750	5130	5370	5550	5650	5750																							
9(a)	Describe the starting of Synchronous Motor using soft starter.									7M	CO4	L2																				
(b)	Derive the torque equation of Synchronous Motor.									7M	CO4	L3																				
(OR)																																
10(a)	Discuss the effect of changing excitation with constant load in synchronous motor.									7M	CO4	L2																				
(b)	Illustrate the 'V' and 'inverted V' curves in synchronous motor.									7M	CO4	L2																				

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B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

**20ME11-MACHINE TOOLS AND METROLOGY
(ME)**

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No.	Questions	Marks	CO	BL
1(a)	Converse the nomenclature of single point cutting tool.	7M	CO1	L2
(b)	An orthogonal turning of a 100 mm diameter rod on a lathe, cutting velocity is 48 m/min and feed is 0.4 mm/rev, cutting force 800 N, rake angle 15°, uncut chip thickness 0.5 mm, nominal chip thickness after the cut: 1.25 mm. Calculate the chip thickness ratio, coefficient of chip thickness ratio and shear plane angle and power consumption of turning operation.	7M	CO1	L3
(OR)				
2(a)	Elucidate merchant's force diagram with a neat sketch.	7M	CO1	L2
(b)	What are the various types chips formed in machining process? Explain.	7M	CO1	L1
3(a)	Summarize various types of taper turning methods adopted on lathe machine. Briefly discuss any two methods.	7M	CO2	L2
(b)	With a neat sketch, illustrate the working process of a planner machine.	7M	CO2	L2
(OR)				
4(a)	Describe the basic operations of a Lathe machine.	7M	CO2	L2
(b)	Explicate important components of a shaper machine with a line diagram.	7M	CO2	L2
5(a)	Illustrate the working principle of a horizontal milling machine.	7M	CO3	L2
(b)	Classify various types of drilling machines. With neat a diagram discuss the working of a drilling machine.	7M	CO3	L2
(OR)				
6(a)	Confer the working process of centerless grinding machine with a line diagram.	7M	CO3	L2
(b)	Explain the various operations performed on drilling process with neat sketches.	7M	CO3	L2
7(a)	Elucidate with the help of a diagram the principle of working of a sine bar for angular measurement.	7M	CO4	L2
(b)	What is the importance of surface roughness? Mention the geometrical characteristics of a surface.	7M	CO4	L1
8(a)	With the help of neat sketch depict the construction and working of Tomlinson surface meter.	7M	CO4	L2
(b)	In the measurement of surface roughness, heights of 20 successive peaks and valleys measured from a datum as follows: 25, 25, 40, 25, 35, 16, 40, 22, 25, 34, 25, 40, 20, 36, 28, 18, 20, 25, 30, 38, microns. If these measurements were obtained over a length of 20 mm. Determine the CLA and RMS value of the rough surface.	7M	CO4	L3
9(a)	Differentiate between 'Hole basis system' and 'Shaft basis System' of limits and fits.	7M	CO5	L2
(b)	With neat sketches elaborate the following alignment tests on the lathe. (i) Lathe machine bed (ii) Main spindle run-out (iii) True running of head stock center (iv) Both the centers in vertical plan.	7M	CO5	L2
(OR)				
10(a)	Define fits. Discuss various types of fits in brief.	7M	CO5	L1
(b)	Justify the importance of alignment testing on lathe machine and with neat sketches elaborate the following. (ii) True Running of spindle (iii) True Running of face of spindle nose (iv) True Running of Headstock Centre (v) Parallelism of spindle to saddle.	7M	CO5	L2

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B.Tech. (V Semester) Regular/Supplementary Examinations

20AD05-AUTOMATA AND COMPILER DESIGN

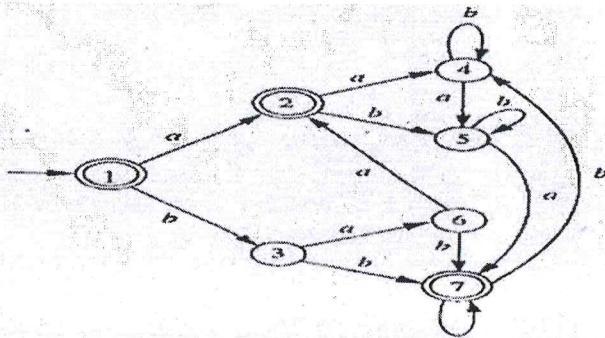
(AI&DS)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Define DFA and Construct DFA which accepts strings 1100 or 1010 only.	7 M	CO1	L2
(b)	Construct Minimized Finite Automata for the following Automaton. 	7 M	CO1	L2
(OR)				
2(a)	Define NDFA and Design an NFA which accepts all binary strings containing 1100 or 1010 as substrings.	7 M	CO1	L2
(b)	Construct a Finite Automata for the Regular Expression given Below $(0+1)^*(00+11)(0+1)^*$.	7 M	CO1	L2
3(a)	Consider a CFG: $S \rightarrow (s)/s\supset s/\sim s/p/q$ Derive string $(\sim\sim p\supset(p\supset\sim\sim q))$.	7 M	CO2	L2
(b)	Find the equivalent Chomsky Normal Form for the given CFG: $S \rightarrow A B C$ $A \rightarrow aAa B$ $B \rightarrow bB bb$ $C \rightarrow aCaa D$ $D \rightarrow baD abD aa$	7M	CO2	L3
(OR)				
4(a)	Show that the following grammar is ambiguous: $S \rightarrow SbS a.$	7M	CO2	L2
(b)	Let the PDA is $M = (\{q_0, q_1\}, \{0, 1\}, \{X, Z_0\}, \delta, q_0, z_0, \Phi)$ $\delta(q_0, 0, Z_0) = (q_0, XZ_0)$ $\delta(q_0, 0, X) = (q_0, XX)$ $\delta(q_0, 1, X) = (q_1, \epsilon)$ $\delta(q_1, 1, X) = (q_1, \epsilon)$ $\delta(q_1, \epsilon, X) = (q_1, \epsilon)$ $\delta(q_1, \epsilon, Z_0) = (q_1, \epsilon)$ Convert this PDA into CFG.	7M	CO2	L3

20AD05-AUTOMATA AND COMPILER DESIGN

5(a)	Construct a block diagram of phases of a compiler and outline the main functions of each phase.	10M	CO3	L2
(b)	Discuss the general format of a LEX program.	4M	CO3	L2
(OR)				
6(a)	Construct the predictive parser for the following grammar. $S \rightarrow (L) \mid a$ $L \rightarrow L, S \mid S$	10M	CO3	L3
(b)	Differentiate phase and pass of a Compiler.	4M	CO3	L2
7(a)	Differentiate S-attributed grammar with L-attributed grammar by taking example.	7M	CO4	L2
(b)	Illustrate the translation scheme that converts infix to postfix form for the following grammar and generate the annotated parse tree for the input string 2+6+1.? $E \rightarrow E+T$ $E \rightarrow T$ $T \rightarrow 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9.$	7M	CO4	L3
(OR)				
8(a)	Illustrate the concept of Syntax Directed Definition (SDD) and Syntax Directed Translation (SDT) with example.	7M	CO4	L2
(b)	Describe SDD for the following looping statements. Give examples (i) While Loop. (ii) For loop.	7M	CO4	L2
9(a)	Discuss briefly about the categories of code optimization.	7M	CO5	L2
(b)	Illustrate about peephole optimization techniques and give examples for each.	7M	CO5	L2
(OR)				
10(a)	Discuss about Code generation Algorithm in detail.	7M	CO5	L2
(b)	Construct the DAG for the following basic block $D := B * C$ $E := A + B$ $B := B * C$ $A := E - D$	7M	CO5	L3

20AE10-AIRCRAFT STRUCTURES-II

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B.Tech. (V Semester) Regular / Supplementary Examinations

20AE10-AIRCRAFT STRUCTURES-II

(ASE)

Time : 3 hours

Max. Marks :70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Obtain the expression of the position of the neutral axis $\tan \alpha = \frac{M_y I_{xx} - M_x I_{xy}}{M_x I_{yy} - M_y I_{xy}}$ and develop the relationship between α and θ (bending moment angle).	7M	CO1	L3
(b)	The thin-walled beam section shown in Figure is subjected to a bending moment $M_x = 3000$ N-m applied in a negative sense. Find the position of the neutral axis and the maximum direct stress in the section. Take $I_{xx} = 2a^3t$, $I_{yy} = a^3t/3$, $I_{xy} = 1.732a^3t/6$, when $a = 90$ mm and $t = 5$ mm.	7M	CO1	L3

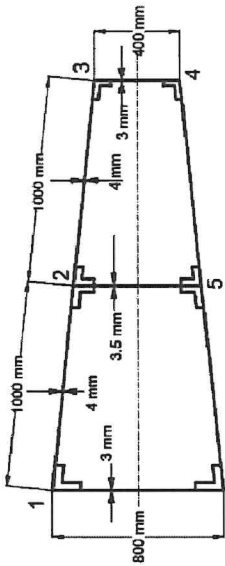
(OR)

2(a)	Differentiate between symmetrical and unsymmetrical bending of beams.	7M	CO1	L2
(b)	Figure shows the section of an angle purlin. A bending moment of 3000 N m is applied to the purlin in a plane at an angle of 30° to the vertical y-axis. If the sense of the bending moment is such that its components M_x and M_y both produce tension in the positive xy-quadrant, calculate the direct stress at points F and C in the purlin. Take $I_{xx} = 3.37 \times 10^6 \text{ mm}^4$, $I_{yy} = 1.93 \times 10^6 \text{ mm}^4$, $I_{xy} = 1.50 \times 10^6 \text{ mm}^4$.	7M	CO1	L3

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9(a)	Idealize a thin rectangular plate having dimensions 'a x b x t' for boom areas B_1 and B_2. When the direct stress distribution in the panel varies linearly from a value σ_1 to an unknown value σ_2. The doubly symmetrical wing section is shown in Figure. has been idealized into an arrangement of direct stress-carrying booms; the boom areas are 250 mm^2. Calculate the direct stresses in the booms when the section is subjected to a bending moment of 200 kN-m in a vertical plane.	CO5	L2
(b)	The doubly symmetrical wing section is shown in Figure. has been idealized into an arrangement of direct stress-carrying booms; the boom areas are 250 mm^2. Calculate the direct stresses in the booms when the section is subjected to a bending moment of 200 kN-m in a vertical plane.	CO5	L3

(OR)

10(a)	Summarize the effect of idealization on the analysis of closed-section beams.	7M	CO5	L2
(b)	Part of a wing section is in the form of the two-cell box shown in Figure in which the vertical spars are connected to the wing skin through angle sections all having a cross-sectional area of 400 mm^2. Idealize the section into an arrangement of direct stress carrying booms and shear stress only carrying panels suitable for resisting bending moments in a vertical plane. Position the booms at the spar/skin junctions. 	7M	CO5	L3

20AE10-AIRCRAFT STRUCTURES-II

3(a)	Show that the shear center lies at the junction for a T-section.	7M	CO2	L2
(b)	Calculate the position of the shear center of the thin-walled section shown in Figure Take $I_{xx} = 72,4094 \text{ mm}^4$.	7M	CO2	L3

(OR)

4(a)	Summarize the characteristics of the shear centre.	7M	CO2	L2
(b)	Determine the position of the shear center of the thin-walled open section subjected to a shear load of $S_y = 100 \text{ N}$, as shown in Figure. Take $I_{xx} = 6.22t^3$ where $t = 1.6 \text{ mm}$, $r = 100 \text{ mm}$.	7M	CO2	L3

(OR)

5(a)	Differentiate shear flow of wall effective and ineffective skin.	4M	CO3	L2
(b)	A uniform thin-walled beam of constant wall thickness $t = 2 \text{ mm}$ has a cross-section in the shape of an isosceles triangle. Figure and is loaded with a vertical shear force $S_y = 250 \text{ N}$ applied at the apex. Assuming that the distribution of shear stress is according to the basic theory of bending, calculate the distribution of shear flow over the plane 3-2 and 2-1. Take $I_{xx} = th^2(h + 2d)/12$, where $h = 80 \text{ mm}$ and $d = 200 \text{ mm}$.	10M	CO3	L3

(OR)

20AE10-AIRCRAFT STRUCTURES-II

6(a)	Summarize torsion of thin-walled open-section beams.	7M	CO3	L2
(b)	The thin-walled section is shown in Figure and is constrained to twist about an axis through R, the center of the semi-circular wall 34. Calculate the maximum shear stress in the section is subjected to a torque of 80 N m and per unit rate of twist. Take $G = 25,000 \text{ N/mm}^2$, $r = 50 \text{ mm}$, $t = 3 \text{ mm}$.	7M	CO3	L3

(OR)

7(a)	Develop the relations for M_x and M_y when a thin plate is subjected to pure bending.	7M	CO4	L3
(b)	A plate 10 mm thick is subjected to bending moments M_x equal to 10 N m/mm and M_y equal to 5 N m/mm. Find the maximum twisting moment per unit length in the plate and the direction of the planes on which this occurs.	7M	CO4	L3

(OR)

8(a)	Express a way to find failure stress in plates and stiffened panels.	7M	CO4	L2
(b)	Figure (a) shows part of the cross-section of the upper surface of a long wing panel in which the thin wing skin is stiffened by a series of "top hat" stiffeners whose cross-section is shown in Figure (b). Both the skin and stiffeners are fabricated from an aluminum alloy having Young's modulus of 70,000 N/mm ² and the equivalent pin-center length of the panel is 600 mm. It's subjected to a compressive stress of 400 N/mm ² . Taking coefficients of 3.62 for buckling of a plate with simply supported sides and of 0.385 with one side simply supported and one free, determine the load per millimeter width of the panel when initial buckling may be expected.	7M	CO4	L3

(a) (b)

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B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

20CE14-ENVIRONMENTAL ENGINEERING

(CE)

Time : 3 hours

Max. Marks: 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Discuss the different sources of water and their impurities in nature.	7M	CO1	L2
(b)	The following data shows the variation in population of a city from 1930-1980. Estimate the population of the city in year 2000 using incremental increase method. The population in the years 1930, 1940, 1950, 1960, 1970 and 1980 are 74,000, 80,000, 110,000, 140,000, 180,000 and 220,000 respectively.	7M	CO1	L3
(OR)				
2(a)	List out the components of a water supply system. Explain their roles.	7M	CO1	L2
(b)	Describe the MPN index method and Coliform index methods.	7M	CO1	L2
3(a)	Explain the following in water treatment (i) Time for horizontal flow (ii) Time for vertical flow (iii) Settling velocity (iv) Horizontal flow velocity (v) Weir loading.	7M	CO1	L2
(b)	A plain sedimentation tank is designed with a SOR of 25 m/d in a water treatment plant carrying 10 MLD of raw water. Assuming liquid depth as 3m, compute (i) Diameter of tank (ii) Detention time (iii) Hopper depth @ 10% slope.	7M	CO2	L3
(OR)				
4(a)	State the purpose of a clari-flocculator. Explain its construction using neat sketch.	7M	CO1	L2
(b)	In a flocculator handling 10 MLD of raw water, a detention time of 20 min is used. Assuming viscosity of water and G values as 1×10^{-3} Ns/m ² and 20 s ⁻¹ , compute (i) Volume of tank, (ii) Power required in the flocculator.	7M	CO3	L3
5.	Explain the construction and working of a rapid sand filter using a neat sketch.	14M	CO3	L2
(OR)				
6(a)	Explain the break-point chlorination and its use in disinfection.	10M	CO3	L2
(b)	In a disinfection process, 10 mg/L of chlorine is used to leave a residual chlorine of 0.2 mg/L. Determine the chlorine demand. If bleaching powder with 30% chlorine is used in the process, determine amount of bleaching powder used.	4M	CO3	L3
7(a)	Describe the following: (i) Total solids (ii) Total fixed solids (iii) Total Volatile solids (iv) Total suspended solids (v) Total Dissolved solids (vi) Total settleable solids. State the relation among them.	7M	CO1	L2
(b)	Discuss the working of a skimming tank using a neat sketch.	7M	CO4	L3
(OR)				
8(a)	Describe the experimental procedure of determining Total settleable solids.	7M	CO1	L2
(b)	A primary sedimentation tank is designed with a SOR of 20 m/d at an average flow of 10 MLD of sewage. Determine its area and diameter. Assuming side water depth of 3.5 m, compute its detention time. Determine its SOR at peak flow for a peak flow rate of 2.	7M	CO4	L3
9(a)	Differentiate between complete mix and diffused aeration processes using neat sketches.	7M	CO5	L2
(b)	Define MLSS and Sludge Volume index in wastewater treatment. Explain their importance and state the relation between them.	7M	CO5	L2
(OR)				
10(a)	Explain the construction of an anaerobic digester using neat sketch.	7M	CO5	L2
(b)	A sludge contains 100 kg/d of dry solids with a specific gravity of 1.01. Assuming 5% solids in the sludge, compute its volume. Assuming 20 cm depth of sludge application, determine the area of the sludge beds per year.	7M	CO5	L3

**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)**

L.B. Reddy Nagar :: Mylavaram - 521 230 :: NTR Dist.:: A.P.

B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20CS13-THEORY OF COMPUTATION

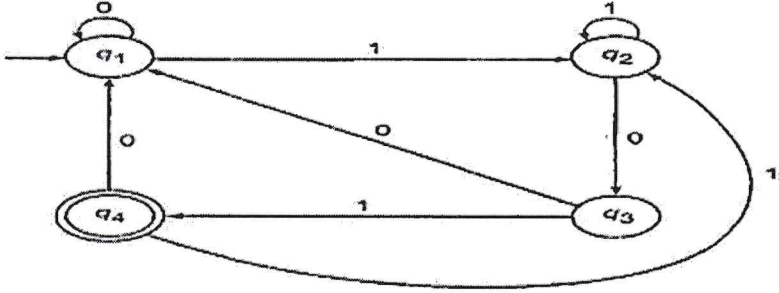
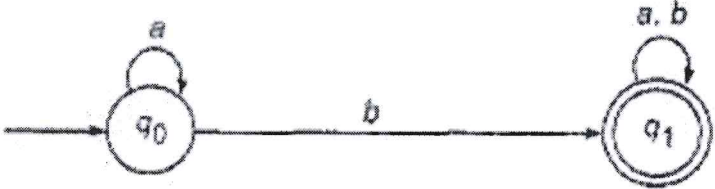
(CSE,CSE(AI&ML) and IT)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	What is Automata? Explain classification of Automata?	7M	CO1	L2
(b)	Prove that if L be the language accepted by NFA then there exists DFA that accepts L.	7M	CO1	L3
(OR)				
2(a)	Compare and contrast Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA). Highlight their differences in terms of design, operation, and expressive power.	7M	CO1	L3
(b)	Design a Moore machine to determine the residue mod 4 for each binary string treated as integers.	7M	CO1	L3
3(a)	Construct the regular expression for the following finite automata. 	7M	CO2	L3
(b)	Construct regular grammar (right linear grammar) for the given DFA. 	7M	CO2	L3
(OR)				
4(a)	Verify that the following languages is not regular $\{a^n b^{2n} \mid n > 0\}$.	7M	CO2	L3
(b)	Construct a DFA for the Regular expression $(0+1)^* (00+11) (0+1)^*$.	7M	CO2	L3
5(a)	Define Normalization of CFG and Explain Different types of Normal forms with example.	7M	CO3	L2
(b)	Define PDA. Construct PDA for $L = \{WcW^R \mid W \text{ is in } (0+1)^*\}$.	7M	CO3	L3
(OR)				

20CS13-THEORY OF COMPUTATION

6(a)	Construct the PDA that accepts the language generated by given grammar. $S \rightarrow aABB \mid aAA$, $A \rightarrow aBB \mid a$, $B \rightarrow bBB \mid A$	7M	CO3	L3
(b)	Find Greibach Normal form equivalent to the CFG. $A1 \rightarrow A3 A2 \mid A2 A3$ $A2 \rightarrow A3 A3 \mid A2 A2 \mid a$ $A3 \rightarrow A2 A2 \mid b$	7M	CO3	L3
7(a)	Define Turing Machine and Instantaneous description with example, and describe what are the languages accepted by TM?	7M	CO4	L2
(b)	Design a Turing machine accepting the language consisting of all palindromes of 0's and 1's.	7M	CO4	L3
(OR)				
8(a)	Explain about Multi tape TM and Multi-dimensional tape TM.	7M	CO4	L2
(b)	Design a TM which performs 1's complement operation on binary string and write difference between PDA and TM with an example.	7M	CO4	L3
9(a)	Explain the relationship between Recursive, RE languages and also write differences between them.	7M	CO5	L2
(b)	What is undecidability? Explain the usage of post correspondence theorem to solve undecidability problems.	7M	CO5	L2
(OR)				
10(a)	Find whether post correspondence problem $P=\{(10,101),(011,11),(101,011)\}$ has match? Give the solution.	7M	CO5	L3
(b)	Explain about Universal Turing Machine.	7M	CO5	L2

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L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.: A.P.

B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20EC11-LINEAR IC APPLICATIONS

(ECE)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Explain Wilson current source with neat diagram.	7M	CO1	L2
(b)	Draw the DC equivalent circuit of dual input balanced output differential amplifier and analyze it.	7M	CO1	L2
(OR)				
2(a)	Compare various differential amplifier configurations.	7M	CO1	L2
(b)	Explain the operation of the current mirror circuit.	7M	CO1	L2
(OR)				
3(a)	Discuss the Ideal and practical characteristics of Op-Amp.	7M	CO1	L2
(b)	Explain the AC characteristics of Op-Amp.	7M	CO1	L2
(OR)				
4(a)	Explain how op-amp can be used as Integrator and Differentiator.	7M	CO2	L2
(b)	Explain the working principle of log amplifier using op-amp.	7M	CO2	L2
(OR)				
5(a)	Draw the first order band reject filter using op-amp and explain its working.	7M	CO4	L2
(b)	Explain the operation of monostable multivibrator using Op-Amp.	7M	CO3	L2
(OR)				
6(a)	Design a first order low pass filter with a cutoff frequency of 1.5 kHz, and a pass band gain of 3.	7M	CO4	L3
(b)	Explain the operation of Wein bridge oscillator using Op-Amp.	7M	CO4	L2
(OR)				
7(a)	Explain how 555 timer can be used as an Astable multivibrator.	7M	CO3	L2
(b)	Draw the block diagram of IC 565 PLL and explain.	7M	CO3	L2
(OR)				
8(a)	Explain any two applications of monostable multivibrator.	7M	CO3	L2
(b)	Explain about IC723 general purpose voltage regulator.	7M	CO3	L2
(OR)				
9(a)	Draw the block diagram of Inverted R-2R ladder DAC and explain its operation.	7M	CO4	L2
(b)	With a neat diagram explain about the counter type ADC.	7M	CO4	L2
(OR)				
10(a)	Explain about the Flash type ADC with a neat diagram.	7M	CO4	L2
(b)	With a neat diagram explain about the dual slope ADC.	7M	CO4	L2

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L.B. Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.: A.P.
B.Tech. (V Semester) Supplementary Examinations

20EE14-POWER ELECTRONICS

(EEE)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Discuss the significance of gate triggering methods in SCR. Explain any two methods in detail.	7M	CO1	L2
(b)	An SCR has a forward blocking voltage of 1.2 kV, and the leakage current is 5 mA. Calculate the power loss in the forward blocking state.	7M	CO1	L3
(OR)				
2(a)	Explain the series and parallel operation of thyristors and highlight the challenges associated with it.	4M	CO1	L2
(b)	A thyristor has a gate current of 50 mA and a gate-cathode voltage of 2.5 V. If the pulse duration is 20 μ s and the frequency is 1 kHz, calculate the gate power loss.	10M	CO1	L3
3.	A three-phase bridge rectifier supplies a resistive load of 10 Ω . The input voltage is 400 V (rms). Calculate the average output current.	14M	CO2	L3
(OR)				
4.	Discuss the impact of source impedance on the performance of phase-controlled rectifiers.	14M	CO2	L2
5(a)	Compare continuous and discontinuous conduction modes in AC voltage controllers.	7M	CO4	L2
(b)	A single-phase AC voltage controller feeds a load of 5 kW with a power factor of 0.8 lagging. Input voltage is 230 V (rms). Calculate the firing angle.	7M	CO4	L3
(OR)				
6(a)	Illustrate the step-up and step-down operation of cyclo-converters with neat diagrams.	7M	CO4	L2
(b)	Design a cyclo-converter to produce an output of 30 Hz from a 50 Hz supply. Calculate the output voltage for a given load.	7M	CO4	L3
7(a)	Describe the working principle of Class-A and Class-D choppers.	7M	CO3	L2
(b)	A buck converter has an input voltage of 48 V, load resistance of 24 Ω , and duty cycle of 0.5. Calculate the output voltage and current.	7M	CO3	L3
(OR)				
8(a)	Derive the expression for the average output voltage in a boost converter.	7M	CO3	L2
(b)	A boost converter has an input of 12 V and a duty ratio of 0.6. The load requires 24 W. Compute the output voltage and inductor current.	7M	CO3	L3
9(a)	Discuss the applications of inverters in renewable energy systems.	7M	CO5	L2
(b)	A single-phase square-wave inverter produces an output of 230V(rms). Compute the RMS value of the fundamental voltage.	7M	CO5	L3
(OR)				
10(a)	Compare single-phase and three-phase inverters with examples.	7M	CO5	L2
(b)	A three-phase VSI supplies a star-connected load with a line voltage of 400 V. Calculate the RMS value of the fundamental output voltage.	7M	CO5	L3

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B.Tech. (V Semester) **Regular**/Supplementary Examinations

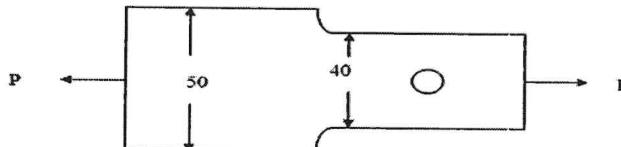
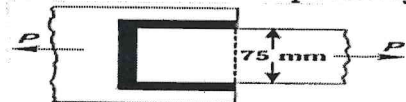
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**20ME12-DESIGN OF MACHINE ELEMENTS-I
(ME)**

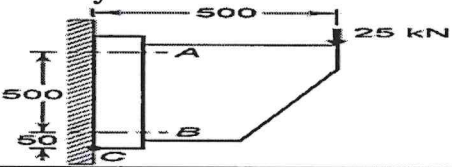
Time : 3 hours

Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Enumerate the basic procedure of machine design.	7M	CO1	L2
(b)	A shaft is transmitting 97.5 kW at 180 r.p.m. If the allowable shear stress in the material is 60 MPa, find the suitable diameter for the shaft. The shaft is not to twist more than 1° in a length of 3 metres. ($C=80\text{GPa}$)	7M	CO1	L3
(OR)				
2(a)	Discuss distortion energy theory of failure and its importance in the design.	4M	CO1	L2
(b)	A mild steel shaft of 60 mm diameter is subjected to a bending moment of 2500 N-m and a torque T. If the yield point of the steel in tension is 200MPa, find the maximum value of this torque without causing yielding of the shaft according to (i) The maximum principal stress; (ii) The maximum shear stress; and (iii) the maximum distortion strain energy theory of yielding.	10M	CO1	L3
3(a)	Discuss various sources of stress concentration in machine elements with neat sketches.	7M	CO2	L2
(b)	A plate with 8 mm diameter hole is subjected to a tensile load of 5000N as shown in figure. The ultimate tensile strength of plate material 200MPa and factor of safety is 2.0. Determine the thickness of the plate. Fillet radius is 5 mm. 	7M	CO2	L3
(OR)				
4(a)	Explain the Soderberg method for combination of stresses.	4M	CO2	L2
(b)	Machine component is subjected to a flexural stress which fluctuates between $+300 \text{ N/mm}^2$ and -150 N/mm^2 . Determine the value of minimum ultimate strength according to Goodman relation. Take Endurance strength = $0.5(\text{Ultimate strength})$; and factor of safety = 2.	10M	CO2	L3
5(a)	Describe the eccentric loaded welded joints.	4M	CO3	L2
(b)	A plate 75 mm wide and 12.5 mm thick is joined with another plate by a single transverse weld and a double parallel fillet weld as shown in Fig. The maximum tensile and shear stresses are 70 MPa and 56 MPa respectively. 	10M	CO3	L3
(OR)				

20ME12-DESIGN OF MACHINE ELEMENTS-I

6(a)	Enumerate the steps involved in designing bolts with eccentric load acting parallel to the axis of bolts.	4M	CO3	L2
(b)	A wall bracket is attached to the wall by means of four identical bolts, two at A and two at B, as shown in Fig. Assuming that the bracket is held against the wall and prevented from tipping about the point C by all four bolts and using an allowable tensile stress in the bolts as 35 N/mm^2, determine the size of the bolts on the basis of maximum principal stress theory. 	10M	CO3	L3
7(a)	Derive the expression for equivalent bending moment of a solid shaft.	7M	CO4	L3
(b)	Compute the diameter of a solid shaft which has to transmit 16kW power at 300 rpm. Ultimate shear stress per shaft material is 350 N/mm^2 and factor of safety for design is 6. If a hollow shaft replaces the solid shaft, find the inside and outside diameters if the ratio is 0.5.	7M	CO4	L3
(OR)				
8.	A shaft is supported by two bearings placed 1 m apart. A 600mm diameter pulley is mounted at a distance of 300 mm to the right of left hand bearing and this drives a pulley directly below it with the help of belt having maximum tension of 2.25 kN. Another pulley 400 mm diameter is placed 200 mm to the left of right hand bearing and is driven with the help of electric motor and belt, which is placed horizontally to the right. The angle of contact for both the pulleys is 180° and $\mu = 0.24$. Determine the suitable diameter for a solid shaft, allowing working stress of 63 MPa in tension and 42 MPa in shear for the material of shaft. Assume that the torque on one pulley is equal to that on the other pulley.	14M	CO4	L3
9(a)	Define cotter joint and list out the types of cotter joints.	4M	CO5	L1
(b)	It is required to design a key for fixing a pulley on the shaft, which is 50 mm in diameter. The pulley transmits 10 kW power at 200 rpm to the shaft. The key is made of steel 45C8 ($S_{yt} = S_{yc} = 380 \text{ N/mm}^2$) and the factor of safety is 3. Determine the dimensions of the key. Assume ($S_{sy} = 0.577S_{yt}$).	10M	CO5	L3
(OR)				
10.	Design a knuckle joint to transmit 120kN, the design stresses may be taken as with permissible stresses in tension, shear and compression are 75Mpa; 60Mpa and 150Mpa respectively.	14M	CO5	L4

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.: A.P.

B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

20ME81-RENEWABLE ENERGY SOURCES

(AI&DS,CE,CSE,CSE(AI&ML) and IT)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit.

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Elucidate the construction and working of pyranometer.	7M	CO1	L1
(b)	List out the advantages and limitations of renewable energy sources.	7M	CO1	L2
(OR)				
2(a)	Explicate the mechanism of solar passive space heating system.	7M	CO1	L1
(b)	Discuss the working procedure of solar distillation process.	7M	CO1	L2
3(a)	Enumerate the merits and demerits of wind energy.	7M	CO2	L1
(b)	Define wind energy and list out the characteristics of wind.	7M	CO2	L2
(OR)				
4(a)	Describe vapor dominated hydrothermal type of geothermal power plant.	10M	CO2	L2
(b)	Define: (i) Hot springs (ii) Hot rocks.	4M	CO2	L1
5(a)	Comprehend the origin of tides.	7M	CO3	L2
(b)	Illustrate the working of double basin system.	7M	CO3	L1
(OR)				
6(a)	What are the merits and demerits of wave energy?	7M	CO3	L2
(b)	With suitable diagram explain the working of dolphin wave energy conversion system.	7M	CO3	L2
7(a)	Define aerobic and anaerobic bio-conversion processes.	7M	CO4	L1
(b)	Elaborate the construction and working of floating drum type biogas plant.	7M	CO4	L1
(OR)				
8(a)	Enumerate the updraft gasification with suitable diagram.	7M	CO4	L1
(b)	List out the applications of gasifiers.	7M	CO4	L2
9(a)	Classify the fuel cells.	7M	CO5	L2
(b)	Illustrate the working of H ₂ -O ₂ fuel cell.	7M	CO5	L1
(OR)				
10(a)	What are the advantages and disadvantages of open cycle MHD over closed cycle MHD?	7M	CO5	L2
(b)	Explain the principle and operation of MHD power generation system.	7M	CO5	L1

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L.B. Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.: A.P.
B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

**20EC81-SATELLITE TECHNOLOGY
(ASE & IT)**

Time : 3 hours

Max. Marks :70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Identify different types of Spacecraft orbits based on altitude, inclination, and eccentricity.	7M	CO1	L1
(b)	Differentiate between Geo stationary and non-Geostationary orbits.	7M	CO2	L2
(OR)				
2(a)	Discuss the Satellite bus system and their functions.	10M	CO2	L2
(b)	Describe the need for space communication in detail.	4M		
3(a)	Evaluate the orbital parameters used to determine the satellite position.	7M	CO3	L2
(b)	The difference between the furthest and the closest points in a satellite's elliptical orbit from the surface of the Earth is 30000 km and the sum of the distances is 50000 km. If the mean radius of the Earth is considered to be 6400 km, determine orbit eccentricity.	7M	CO3	L3
(OR)				
4.	Summarize the following terms: (i) Apogee (ii) Perigee (iii) line of nodes (iv) Station keeping.	14M	CO3	L2
5(a)	Interpret various types of Space batteries based on characteristics and efficiency parameters.	7M	CO2	L2
(b)	Describe the working principle of Solar cell with a neat sketch.	7M	CO2	L2
(OR)				
6(a)	Justify how Onboard computer is important in satellites.	7M	CO3	L2
(b)	Interpret the importance and functioning of ground check out system of satellites.	7M	CO3	L2
7(a)	Assess the importance of 3- axis stabilization in satellite control design.	7M	CO1	L2
(b)	Compose the salient characteristics of a solar cell used in power control.	7M	CO4	L2
(OR)				
8(a)	Distinguish Mass expulsion and momentum exchange control system.	7M	CO4	L2
(b)	Paraphrase the following : (i) Inertial Sensors (ii) Star and Sun Sensors (iii) Earth sensors.	7M	CO4	L2
9(a)	Distinguish between DBS and TVRO with respect to DTH services.	7M	CO4	L3
(b)	Interpret the principle of operation of a VSAT and mention the applications.	7M	CO4	L2
(OR)				
10(a)	Discuss the factors to be considered in the design of a satellite structure and the types of materials used.	7M	CO4	L2
(b)	Paraphrase the following : (i) Satellite Mobile services (ii) RADARSAT.	7M	CO4	L2

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

L.B. Reddy Nagar:: Mylavaram – 521 230 :: NTR Dist.: A.P.

B.Tech. (V Semester) Supplementary Examinations

20AD81-INTRODUCTION TO ARTIFICIAL INTELLIGENCE

(CE,EEE & ME)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Demonstrate goal based and learning based agents with neat sketch.	7M	CO1	L2
(b)	Explain the historical development of AI, highlighting key milestones and breakthroughs in the field.	7M	CO1	L2
(OR)				
2(a)	Explain various categorizations of intelligent systems.	7M	CO1	L1
(b)	Discuss how different types of environments can impact the design and behavior of agents? Provide examples to support your analysis.	7M	CO1	L2
3.	Describe the Informed and Uninformed search strategies.	14M	CO2	L2
(OR)				
4(a)	Write A* algorithm. Use a suitable example to show how the A* algorithm is used for problem reduction.	7M	CO2	L3
(b)	Demonstrate the Best first searching technique with an example.	7M	CO2	L3
5(a)	Implement Uniform Cost Search with an example.	7M	CO3	L3
(b)	Implement Iterative deepening DFS technique.	7M	CO3	L3
(OR)				
6(a)	Illustrate Depth first Search algorithm to find solution to the problem with an example.	7M	CO3	L3
(b)	Implement Breadth first Search with an example.	7M	CO3	L3
7(a)	Describe forward Chaining with example.	7M	CO4	L2
(b)	Illustrate the types of knowledge Representation.	7M	CO4	L3
(OR)				
8(a)	Describe the challenges in knowledge representation.	7M	CO4	L2
(b)	Demonstrate Alpha-Beta pruning with suitable Example.	7M	CO4	L3
9(a)	Discuss the applications of event representation.	7 M	CO5	L2
(b)	Describe with examples, how can mental states influence the design of intelligent agents.	7 M	CO5	L2
(OR)				
10(a)	Describe the process of designing an ontology.	7 M	CO5	L2
(b)	Discuss the significance of categories and objects in knowledge representation.	7 M	CO5	L2

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L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.: A.P.

B.Tech. (V Semester) **Regular**/Supplementary Examinations

20IT81-OOP THROUGH JAVA

(ECE,EEE&ME)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	"Java String is the most used class in the Java language despite its immutability." Clarify this statement with detailed explanation with examples.	7M	CO1	L2
(b)	Write a java program that prints prime numbers in a given range.	7M	CO1	L3
(OR)				
2(a)	Write a Java program that multiplies two matrices of any size, first verifying if multiplication is feasible between the matrices, then computing their product.	7M	CO1	L3
(b)	Explain the key features or buzzwords of Java that make it a popular programming language.	7M	CO1	L2
3(a)	Explain dynamic binding in java with the help of an example.	7M	CO2	L2
(b)	Discuss about "super" keyword in java with the help of examples.	7M	CO2	L2
(OR)				
4(a)	Discuss the different types of inheritance in Java, explaining the purpose and usage of Inheritance in java with examples.	7M	CO2	L3
(b)	Write a Java program with an abstract class Shape that contains both an abstract method area() and a non-abstract method displayInfo(). Create two subclasses Triangle and Square that implement the area() method. In the main method, call both area() and displayInfo() for each shape.	7M	CO2	L2
5(a)	Discuss how multiple inheritance is implemented in java.	7M	CO3	L1
(b)	Discuss about the usage and significance of access modifiers in java with examples.	7M	CO3	L2
(OR)				
6(a)	Write a Java program that defines a Shape3D interface with volume() and surfaceArea() methods, then implements it in Cube and Sphere classes to calculate and display their volume and surface area.	7M	CO3	L2
(b)	Explain the usage of the valueOf(), toString(), parseXxx() and xxxValue() methods in all wrapper classes.	7M	CO3	L2
7(a)	Explain the concept of exception handling in Java, with an example to illustrate its usage.	7M	CO4	L1
(b)	"Exception handling in Java involves managing both checked and unchecked exceptions". Explain this statement in detail.	7M	CO4	L1
(OR)				
8(a)	Explain the difference between throw and throws keywords in Java with the help of an example.	7M	CO4	L1
(b)	Write a Java program to define and use a custom exception in a specific scenario.	7M	CO4	L2
9(a)	Write a java program that creates three threads and the three threads prints "Thread1:Hello", "Thread2:Welcome", "Thread3:Good morning" for every 3,6, and 9 seconds respectively.	7M	CO5	L2
(b)	Discuss the different phases that a thread undergoes during its life cycle in Java.	7M	CO5	L2
(OR)				
10(a)	Write a java program that creates two threads printing the prime numbers in two different ranges using Runnable interface.	7M	CO5	L2
(b)	Discuss how synchronization can help avoid race conditions in Java with an example.	7M	CO5	L1

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L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.: A.P.

B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

20EE84-ELECTRIC VEHICLES

(ME)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Demonstrate about Electric vehicles and list out their merits.	4M	CO1	L2
(b)	Draw a general lay out of an Electric Vehicle and discuss the transmission characteristics.	10M	CO1	L2
(OR)				
2(a)	Generalize about the social impact of conventional vehicles to the atmosphere over Electric Vehicles.	7M	CO1	L2
(b)	Interpret about the tractive effort generated by the Electric Vehicles and state the relation between tractive effort to Rolling resistance, Aerodynamic drag and Gravitational force.	7M	CO1	L2
3(a)	Define battery and describe about various battery parts and it's working.	7M	CO2	L2
(b)	Summarize the detailed procedure of Electrical, Thermal, and Mechanical design of a battery.	7M	CO2	L2
(OR)				
4(a)	Describe about C rate of a battery (Charge rate/ Discharge rate) with their characteristics in graphical representations.	7M	CO2	L2
(b)	List the various general parameters of battery and explain each one.	7M	CO2	L2
5(a)	Discriminate Motor Drive with an IC Engine and list their advantages and disadvantages.	7M	CO3	L2
(b)	Classify and elaborate different types of BLDC motors used in Electric Vehicles.	7M	CO3	L2
(OR)				
6(a)	Illustrate construction and working principle of 3- ϕ Induction Motor to produce mechanical propulsion for Electric Vehicles with a neat sketch.	7M	CO3	L2
(b)	Plot the Speed, Power and, Torque characteristics of Permanent Magnet Brush Less DC motor for EV application.	7M	CO3	L2
7.	Illustrate Basic and Modern Electric Vehicle Drive Train configurations with neat block diagrams with their subsystems and discuss their functions.	14M	CO4	L2
(OR)				
8(a)	Illustrate about re-generative braking with neat sketch with respective to Electrical Vehicles.	7M	CO4	L2
(b)	Classify and elaborate various EV drive train alternatives based on Drive Train configuration with neat diagrams.	7M	CO4	L2
9(a)	Summarize about Hybrid Electric Vehicles.	7M	CO5	L2
(b)	Draw and discuss the typical configuration of a parallel hybrid electric drive train.	7M	CO5	L2
(OR)				
10(a)	Draw and discuss the typical configuration of a series hybrid electric vehicle drive train design.	7M	CO5	L2
(b)	Analyze about the component sizing methodology of Electric Vehicles using optimization algorithm.	7M	CO5	L3

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)**

L.B. Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.: A.P.

B.Tech. (V Semester) ~~Regular~~ / Supplementary Examinations

20CS24-CLOUD COMPUTING

(AI&DS)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Write about Scalable Computing over the Internet.	7M	CO1	L2
(b)	Explain performance and security issue of cloud in detail.	7M	CO1	L2
(OR)				
2(a)	Explain Performance Metrics and Amdahl's law.	7M	CO1	L2
(b)	Write on the System Models for Distributed and Cloud Computing.	7M	CO1	L2
3(a)	Discuss Virtualization for data Centers in detail.	7M	CO2	L2
(b)	Explain virtualization structure in detail.	7M	CO2	L2
(OR)				
4(a)	Explain various Implementation Levels of Virtualisation.	7M	CO2	L2
(b)	What is VMM? Explain Xen Architecture.	7M	CO2	L2
5(a)	Explain Cloud Services (SaaS, PaaS & IaaS) in detail.	7M	CO3	L2
(b)	Discuss different types of Cloud in detail.	7M	CO3	L2
(OR)				
6(a)	What are the advantages of Virtualization?	7M	CO3	L1
(b)	Explain AWS with the help of diagram.	7M	CO3	L2
7(a)	Discuss in detail on Fair queuing.	7M	CO4	L2
(b)	Explain the concept of Borrowed Virtual Time in detail.	7M	CO4	L2
(OR)				
8(a)	Explain in detail about Start-up fair queuing.	7M	CO4	L2
(b)	Discuss on Cloud scheduling subject to deadlines.	7M	CO4	L2
9(a)	Discuss on Storage Systems in Cloud with examples.	7M	CO5	L2
(b)	List out various Data Storage Devices and explain.	7M	CO5	L1
(OR)				
10(a)	Explain Storage Models with suitable example.	7M	CO5	L2
(b)	Explain General Parallel File system in detail.	7M	CO5	L2

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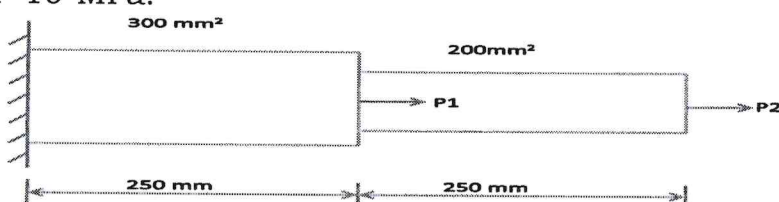
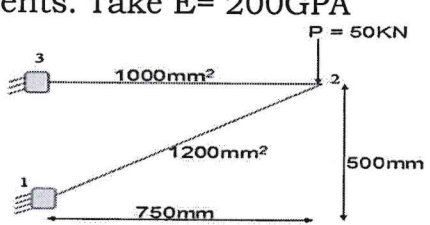
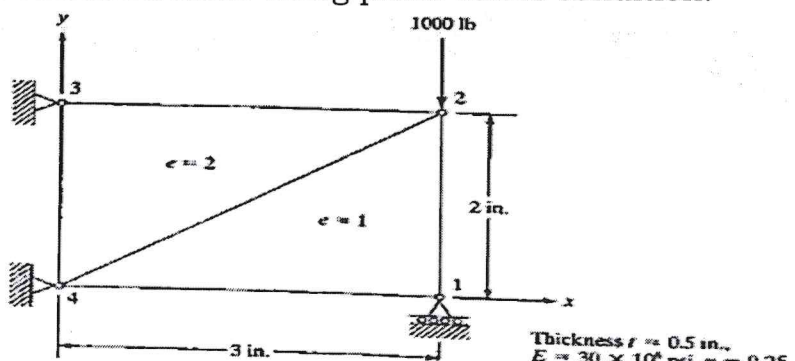
B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

**20AE12-FINITE ELEMENT METHODS IN ENGINEERING
(ASE)**

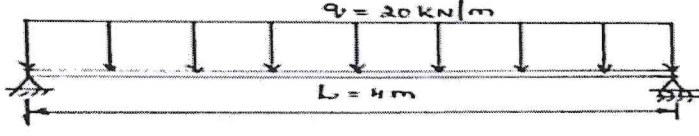
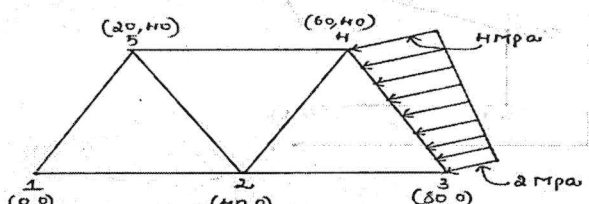
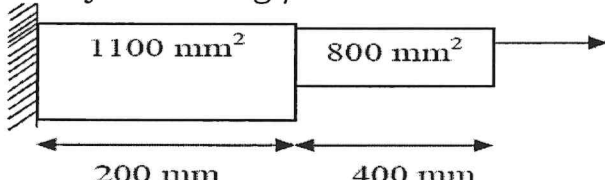
Time : 3 hours

Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	State the minimum potential Energy principle and write the expression for it.	4M	CO1	L1
(b)	Discuss the shape function and derive the shape functions for one dimensional bar element.	10M	CO1	L2
2(a)	Derive the element stiffness matrix $[k]$ for one dimensional bar element?	4M	CO1	L3
(b)	Compute the nodal displacements, stresses and reaction at the support in the stepped bar subjected to an axial load of $P_1=3000\text{N}$ and $P_2=2000\text{N}$ as shown in figure. $E=2.1 \times 10^5 \text{MPa}$. 	10M	CO1	L3
3(a)	Elaborate the Transformation matrix(L) for a truss element with a neat sketch.	7M	CO2	L2
(b)	For the two-bar truss shown in Figure, Determine the nodal displacements. Take $E=200\text{GPa}$ 	7M	CO2	L3
(OR)				
4	For the two-dimensional loaded plate shown in figure. Determine the displacements of node 1 and node 2 and the element stresses using plane stress condition. 	14M	CO2	L3

20AE12-FINITE ELEMENT METHODS IN ENGINEERING

5(a)	How do you incorporate boundary conditions into the stiffness matrix of a beam element?	4M	CO3	L1
(b)	Determine the stiffness matrix for the beam subjected to the uniformly distributed load $q=20 \text{ kN/m}$ as shown in Figure. Given $L=4\text{m}$, $E=200 \text{ Gpa}$, $I=0.5 \text{ m}^4$ 	10M	CO3	L3
(OR)				
6(a)	Derive the element stiffness matrix $[k]$ for a triangular CST element?	7M	CO3	L3
(b)	A two-dimensional plate is shown in figure. How could you evaluate the traction loads at nodes 3 and 4 for the linearly distributed load acting on the edge 3-4. Given thickness=10mm. 	7M	CO3	L1
(OR)				
7(a)	Write the stiffness matrix of an Axisymmetric element using potential energy approach	4M	CO4	L1
(b)	The nodal coordinates for an axi-symmetric element are (1,3),(6,8) and (4,6). Calculate strain-displacement matrix for the element at centroid.	10M	CO4	L3
(OR)				
8(a)	Apply plane stress equations of rectangular element = $2 \times 10^5 \text{ N/mm}^2$, $\nu=0.3$, and $Q=[0,0,0.45,0.075,0.15,0.08,0,0]$ T in mm. Find J matrix, and B matrix where $\xi=0$ & $\eta=0$ nodal coordinates given as (0,0) (2,0) (2,1) (0,1).	10M	CO4	L3
(b)	Explain the principle of Gaussian Quadrature for numerical integration.	4M	CO4	L2
(OR)				
9(a)	What is dynamic analysis in FEM, and why is it important?	7M	CO5	L1
(b)	State the Hamilton's principle and equation of motion.	7M	CO5	L1
(OR)				
10(a)	Determine the natural frequencies and mode shapes of the stepped bar shown in figure. Assume $E = 2 \times 10^5 \text{ N/mm}^2$, Density = 7250 kg / m^3 . 	14M	CO5	L3

**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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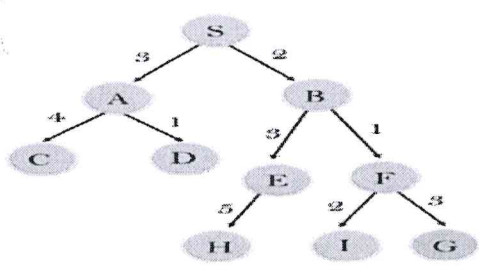
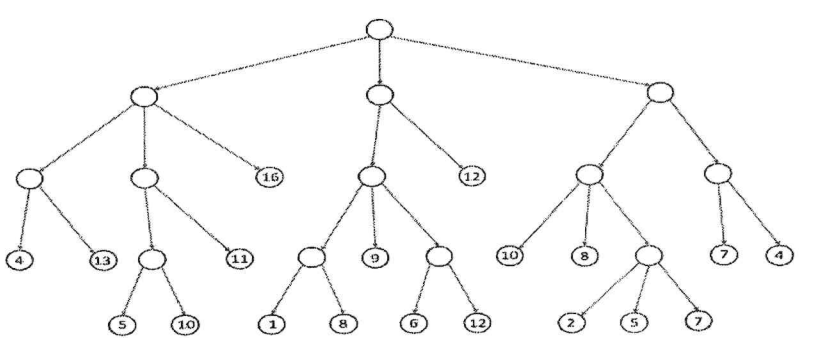
L.B.Reddy Nagar :: Mylavaram – 521 230 :: N.T.R Dist.: A.P.
B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20CS16-PRINCIPLES OF ARTIFICIAL INTELLIGENCE
(CSE & IT)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL																						
1(a)	Discuss the model based and utility-based agents in detail with neat sketch.	7M	CO1	L2																						
(b)	How to build a system to solve a particular problem? Explain with vacuum world state space Problem.	7M	CO1	L2																						
(OR)																										
2(a)	Discuss the simple reflex agent and goal-based agents in detail with neat sketch.	7M	CO1	L2																						
(b)	How agent is different from software? Discuss with example.	7M	CO1	L2																						
3(a)	Describe the uniform cost search and Depth limited iterative search with example. and write the algorithm for each one.	7M	CO2	L2																						
(b)	Discuss the following toy problems with example. (i) N-queens (ii) Missionaries cannibals.	7M	CO2	L2																						
(OR)																										
4(a)	Make use of Best first search algorithm for the following tree. <table><thead><tr><th>node</th><th>H (n)</th></tr></thead><tbody><tr><td>A</td><td>12</td></tr><tr><td>B</td><td>4</td></tr><tr><td>C</td><td>7</td></tr><tr><td>D</td><td>3</td></tr><tr><td>E</td><td>8</td></tr><tr><td>F</td><td>2</td></tr><tr><td>H</td><td>4</td></tr><tr><td>I</td><td>9</td></tr><tr><td>S</td><td>13</td></tr><tr><td>G</td><td>0</td></tr></tbody></table>	node	H (n)	A	12	B	4	C	7	D	3	E	8	F	2	H	4	I	9	S	13	G	0	7M	CO2	L2
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G	0																									
(b)	Paraphrase the simulated annealing with example.	7M	CO2	L2																						
5(a)	Examine the following issues related to knowledge representation with example. (i) Representing Sets of Objects. (ii) Finding the Right structures as Needed.	7M	CO3	L3																						
(b)	Apply the Minimax algorithm to compute the minimax value at each node for the game tree below. 	7M	CO3	L3																						
(OR)																										

20CS16-PRINCIPLES OF ARTIFICIAL INTELLIGENCE

6(a)	Demonstrate the following approaches to knowledge representation with example. (i) Simple relational knowledge (ii) Inferential knowledge	7M	CO3	L3
(b)	Prepare the property of inheritance algorithm with example.	7M	CO3	L3
7.	Consider the following sentences and Prove that John likes peanuts using resolution technique. • John likes all kind of food • Apple and vegetable are food • Anything anyone eats and not killed is food • Anil eats peanuts and still alive • Harry eats everything that Anil eats • John likes peanuts.	14M	CO4	L2
(OR)				
8.	Discuss the procedure for Matching using representation knowledge with example.	14M	CO4	L2
9(a)	Summarize dumpster Shafer theory in detail with example.	7M	CO5	L2
(b)	Discuss the learning decision tree in detail.	7M	CO5	L2
(OR)				
10(a)	Discuss the fuzzy logic in detail with example.	7M	CO5	L2
(b)	Discuss in detail about supervised and unsupervised learning.	7M	CO5	L2

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B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20EC14-DATA COMMUNICATION AND COMPUTER NETWORKS

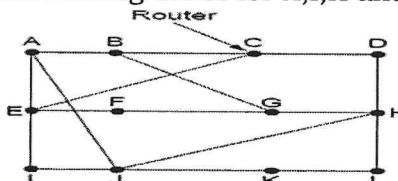
(ECE)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL																																																																	
1(a)	Identify functions of each layer in OSI reference model.	7M	CO1	L2																																																																	
(b)	Explain different guided and unguided media.	7M	CO1	L2																																																																	
(OR)																																																																					
2(a)	Enumerate various applications of computer networks.	7M	CO1	L2																																																																	
(b)	Outline the TCP/IP model used in computer networks.	7M	CO1	L2																																																																	
3(a)	Describe how Hamming code is useful for error correction and detection. Consider the Data: 1010111 for Hamming code, and answer the following: (i) Calculate the number of redundancy bits required (ii) Determine the positions of various data bits and redundancy bits (iii) Determine the values of redundant bits.	7M	CO2	L3																																																																	
(b)	Discuss about Pure aloha and slotted aloha.	7M	CO2	L2																																																																	
(OR)																																																																					
4(a)	Illustrate the working of CSMA multiple access protocol with a diagram.	7M	CO2	L2																																																																	
(b)	Interpret the working of Go-back-N ARQ protocol.	7M	CO2	L2																																																																	
5(a)	Explain the working of Distance vector routing. Consider the following subnet and construct the new routing table for node J using Distance Vector Routing Algorithm. Delay: JA-8, JI-10, JH-12, JK-6 and routing tables for A,I,H and K are as follows:  Router <table border="1"> <thead> <tr> <th>To</th> <th>A</th> <th>I</th> <th>H</th> <th>K</th> </tr> </thead> <tbody> <tr><td>A</td><td>0</td><td>24</td><td>20</td><td>21</td></tr> <tr><td>B</td><td>12</td><td>36</td><td>31</td><td>28</td></tr> <tr><td>C</td><td>25</td><td>18</td><td>19</td><td>36</td></tr> <tr><td>D</td><td>40</td><td>27</td><td>8</td><td>24</td></tr> <tr><td>E</td><td>14</td><td>7</td><td>30</td><td>22</td></tr> <tr><td>F</td><td>23</td><td>20</td><td>19</td><td>40</td></tr> <tr><td>G</td><td>18</td><td>31</td><td>6</td><td>31</td></tr> <tr><td>H</td><td>17</td><td>20</td><td>0</td><td>19</td></tr> <tr><td>I</td><td>21</td><td>0</td><td>14</td><td>22</td></tr> <tr><td>J</td><td>9</td><td>11</td><td>7</td><td>10</td></tr> <tr><td>K</td><td>24</td><td>22</td><td>22</td><td>0</td></tr> <tr><td>L</td><td>29</td><td>33</td><td>9</td><td>9</td></tr> </tbody> </table> JA delay is 8 JI delay is 10 JH delay is 12 JK delay is 6 Vectors received from J's four neighbors	To	A	I	H	K	A	0	24	20	21	B	12	36	31	28	C	25	18	19	36	D	40	27	8	24	E	14	7	30	22	F	23	20	19	40	G	18	31	6	31	H	17	20	0	19	I	21	0	14	22	J	9	11	7	10	K	24	22	22	0	L	29	33	9	9	7M	CO3	L3
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(b)	Identify the need of Optimality principle.	7M	CO3	L2																																																																	
(OR)																																																																					
6(a)	Discuss the significance of Hierarchical routing.	7M	CO3	L2																																																																	
(b)	With an example show how Dijkstras algorithm will helps in finding shortest path.	7M	CO3	L3																																																																	
7(a)	Outline the importance of classful and classless addressing.	7M	CO3	L3																																																																	
(b)	Draw IPV6 Header and explain each field in detail.	7M	CO2	L2																																																																	
(OR)																																																																					
8(a)	Interpret the three-way handshake mechanism for Connection establishment.	7M	CO3	L3																																																																	
(b)	Enumerate various fields present in IPV4 Header.	7M	CO2	L2																																																																	
9(a)	Discuss RTTP header and its fields.	7M	CO4	L2																																																																	
(b)	Discuss various components of World wide web architecture.	7M	CO4	L2																																																																	
(OR)																																																																					
10(a)	Outline the TCP Segment header and its fields.	7M	CO4	L2																																																																	
(b)	Briefly explain about Structure of management information.	7M	CO4	L2																																																																	

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B.Tech. (V Semester) ~~Regular~~/Supplementary Examinations

20EE16-LINEAR AND DIGITAL IC APPLICATIONS

(EEE)

Time : 3 hours

Max. Marks: 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Analyse the operation of the comparator in inverting and non-inverting mode of operation.	7M	CO1	L3
(b)	Explain the DC characteristics of an op-amp briefly.	7M	CO1	L2
(OR)				
2(a)	Draw the circuit diagram of an integrator circuit and explain its functioning with the Input-output waveforms. Derive the output voltage V_0 of an integrator circuit.	7M	CO1	L2
(b)	Explain the AC characteristics of an op-amp.	7M	CO1	L2
3.	Draw the schematic diagram of the RC phase shift Oscillator and derive the expression for the oscillation frequency.	14M	CO1	L2
(OR)				
4(a)	Classify the filters and explain the characteristics of each one of them.	7M	CO2	L2
(b)	Discuss in detail the operation of the square waveform generator.	7M	CO1	L2
5.	Sketch the internal circuit diagram of the 555 timer and explain the function of each block.	14M	CO1	L2
(OR)				
6(a)	Draw the schematic circuit diagram of successive approximation A/D converter and explain its operation.	7M	CO1	L2
(b)	With a neat circuit diagram, explain the functioning of an inverted R-2R ladder type DAC.	7M	CO1	L2
7(a)	Analyze the CMOS 2-input NOR gate.	7M	CO3	L3
(b)	Design a comparator to compare two 8-bit data using a 74XX85 4-bit comparator.	7M	CO3	L3
(OR)				
8(a)	Analyze the TTL logic of NAND gate.	7M	CO3	L3
(b)	Show how two 74LS283 adders can be connected to form an 8-bit parallel adder.	7M	CO3	L2
9(a)	List different types of RAMs.	7M	CO4	L1
(b)	Draw the architecture diagram of ROM and explain.	7M	CO4	L2
(OR)				
10(a)	Design a modulus-12 counter using 74XX163 4-bit synchronous binary counter.	7M	CO3	L3
(b)	Design a decade counter using a 74XX93 4-bit asynchronous binary counter.	7M	CO3	L3

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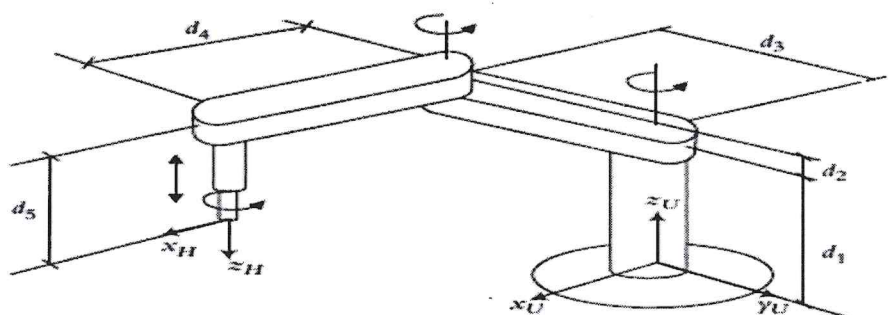
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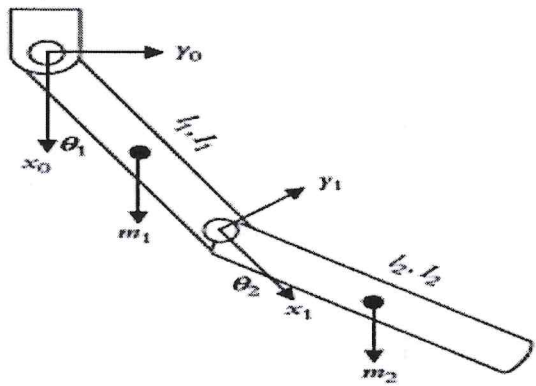
**20ME14-ROBOTICS
(ME)**

Time : 3 hours

Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	What is the precision of movement of a robot? Explain the terms spatial resolution, accuracy, and repeatability.	7M	CO1	L2
(b)	Compare and contrast the applications and limitations of different types of end effectors (mechanical, vacuum, and adhesive) in complex industrial settings.	7M	CO1	L3
(OR)				
2(a)	Recall the main types of robotic joints used in robotics.	7M	CO1	L2
(b)	Enumerate the relative advantages of different robot configurations regarding flexibility and suitability for various industrial applications.	7M	CO1	L3
(OR)				
3(a)	Describe the main applications of hydraulic actuators in industrial automation.	7M	CO2	L2
(b)	Assess how different sensor characteristics impact the selection of sensors for robotic applications requiring high precision and reliability.	7M	CO2	L3
(OR)				
4(a)	Summarize the limitations of pneumatic actuators in terms of control and efficiency.	7M	CO2	L2
(b)	In a scenario requiring measurement of slight positional changes, identify a suitable position sensor and justify your choice.	7M	CO2	L3
5.	For the following SCARA-type robot, as shown: - Assign the coordinate frames based on the D-H representation. - Fill out the parameters table. - Write all the A matrices. - Write the ${}^U T_H$ matrix in terms of the A matrices.  The diagram shows a SCARA robot with a base joint (revolute) and two prismatic joints. The base joint has a vertical axis z_U and a horizontal axis x_U. The first prismatic joint has a vertical axis z_H and a horizontal axis x_H. The second prismatic joint has a vertical axis z_U and a horizontal axis y_U. Dimensions are labeled: d_1 is the base height, d_2 is the first arm length, d_3 is the second arm length, d_4 is the third arm length, and d_5 is the fourth arm length. Coordinate frames are indicated by x_U, y_U, z_U and x_H, z_H.	14M	CO3	L4
(OR)				
6(a)	List the basic coordinate frames used in describing objects in space.	7M	CO3	L2

(b)	A robotic manipulator has a joint positioned at $(1,2,0)^T$. The manipulator is moved such that it rotates 30° about the x-axis and then translates by 2 units along the y-axis. Using homogeneous coordinates, find the new position of the joint after these transformations.	7M	CO3	L3
7(a)	Compare the strengths and limitations of the Lagrange-Euler and Newton-Euler methods in robotic dynamics analysis.	7M	CO4	L2
(b)	As a result of applying a set of differential motions to frame T shown, it has changed the amount of dT as shown. Find the magnitude of the differential changes made (dx. dy. dz. δx . δy . δz) and the differential operator Δ with respect to frame T. $T = \begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 0 & 1 & 3 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ and $dT = \begin{bmatrix} 0 & -0.1 & -0.6 & 0.6 \\ 0.1 & 0 & 0 & 0.5 \\ -0.1 & 0 & 0 & -0.5 \\ 0 & 0 & 0 & 0 \end{bmatrix}$	7M	CO4	L3
(OR)				
8.	Derive the equations of motion for the 2-link mechanism with distributed mass, as shown: 	14M	CO4	L4
9(a)	Describe how robots are used in inspection processes.	7M	CO5	L2
(b)	A robotic arm moves along a path divided into three segments: Segment 1 (linear) from (1,1) m to (4,1) m in 3 seconds, Segment 2 (linear) from (4,1) m to (4,4) m in 2 seconds, and Segment 3 (linear) from (4,4) m to (6,6) m in 4 seconds. Determine the trajectory points at each second for the entire path.	7M	CO5	L3
(OR)				
10(a)	Given a scenario of transferring materials across different stations in a factory, outline a basic robotic solution for this task.	7M	CO5	L2
(b)	A robot's end effector follows a circular trajectory with a radius $R=5$ m, centred at (0,0) m. If it starts at (5,0) m and moves counterclockwise to (0,5) m in 5 seconds, calculate the required angular velocity and position along the path at each second.	7M	CO5	L3