



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. (IV Semester) (R20) Semester End Examinations (Supplementary) April 2026

TIME TABLE

R20

Time : 02.00 PM to 05.00 PM

A.Y. 2025-26

Branch	16-04-2026 (Thursday)	17-04-2026 (Friday)	20-04-2026 (Monday)	21-04-2026 (Tuesday)	22-04-2026 (Wednesday)	23-04-2026 (Thursday)
AI & DS	---	20CS06-Design and Analysis of Algorithms	20CS10 -Data Warehousing and Data Mining	20CS11-Operating Systems	20AD03-Introduction to Artificial Intelligence and Data Science	20HS01-Universal Human Values 2: Understanding Harmony
ASE	---	20FE09-Probability and Statistics	20AE05-Aerospace Materials and Manufacturing	20AE06-Aerodynamics	20AE07-Aircraft Structures-I	20HS01-Universal Human Values 2: Understanding Harmony
CE	---	20FE09-Probability and Statistics	20CE09-Hydraulics and Hydraulic Machinery Systems	20CE10-Geo Technical Engineering	20CE11-Structural Analysis	20HS01-Universal Human Values 2: Understanding Harmony
CSE	20MC02-Environmental Science	20CS06-Design and Analysis of Algorithms	20CS10-Data Warehousing and Data Mining	20CS11-Operating Systems	20IT01-Software Engineering	20HS01-Universal Human Values 2: Understanding Harmony
CSE (AI & ML)	20MC02-Environmental Science	20CS06-Design and Analysis of Algorithms	20CS10-Data Warehousing and Data Mining	20CS11-Operating Systems	20AM01 - Introduction to Artificial Intelligence and Machine Learning	20HS01-Universal Human Values 2: Understanding Harmony
ECE	20MC02-Environmental Science	20EC08-Electromagnetic Waves and Transmission Lines	20EC06-Digital Signal Processing	20EE09-Control Systems	20EC07-Analog Communications	20HS01-Universal Human Values 2: Understanding Harmony
EEE	---	20EE11-Electrical Machines-I	20EE08-Power Systems-I	20EE09-Control Systems	20EE10-Analog Electronics	20HS01-Universal Human Values 2: Understanding Harmony
IT	20MC02-Environmental Science	20CS06-Design and Analysis of Algorithms	20CS10-Data Warehousing and Data Mining	20CS11-Operating Systems	20IT01-Software Engineering	20HS01-Universal Human Values 2: Understanding Harmony
ME	---	20FE09-Probability and Statistics	20ME07-Applied Thermodynamics	20ME08-Production Technology	20ME09-Theory of Machines	20HS01-Universal Human Values 2: Understanding Harmony

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

Date: 02 APR 2026

CONTROLLER OF EXAMINATIONS

PRINCIPAL

Copy to: 1. Vice-Principal, Deans & HoDs 2. T&P cell, Transport in-charge & Librarian
3. Centres, BD, Security & Hostels 4. Coordinator Disciplinary 5. Notice Boards

17 APR 2026

H.T.No

R20

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

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

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

20CS06-DESIGN AND ANALYSIS OF ALGORITHMS

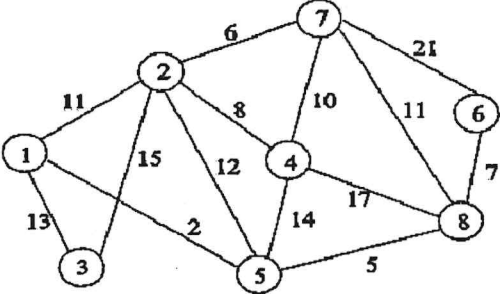
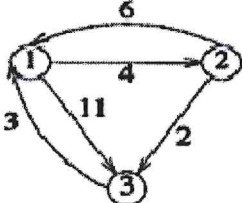
(AI&DS,CSE, CSE(AI&ML) and IT)

Time : 3 hours

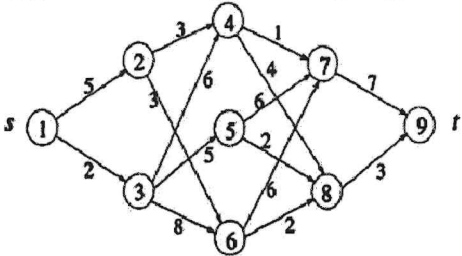
Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Find out the time complexity of the algorithm for sum of 'n' natural numbers using step count method.	7M	CO1	L2
(b)	Illustrate the characteristics of an algorithm. How it can be analyzed?	7M	CO1	L2
(OR)				
2(a)	Apply Divide and Conquer and sort the following elements using Quick Sort algorithm 69, 75, 70, 89, 15, 60, 50, 30, 45, 20.	7M	CO2	L3
(b)	Analyze the worst-case and best-case time complexity of quick sort algorithm.	7M	CO2	L2
(OR)				
3(a)	What is the solution generated by the Job Scheduler when $n=7$, $(P_1, P_2, P_3, P_4, P_5, P_6, P_7) = (3, 5, 20, 18, 1, 6, 30)$ and $(d_1, d_2, d_3, d_4, d_5, d_6, d_7) = (1, 3, 4, 3, 2, 1, 2)$.	7M	CO3	L3
(b)	Use greedy approach to find an optimal solution to the Knapsack instance $n=7$, $m=15$, $(p_1, p_2, p_3, p_4, p_5, p_6, p_7) = (10, 5, 15, 7, 6, 18, 3)$ and $(w_1, w_2, w_3, w_4, w_5, w_6, w_7) = (2, 3, 5, 7, 1, 4, 1)$.	7M	CO3	L3
(OR)				
4(a)	 Write Prim's algorithm and Compute a minimum cost spanning tree for the above graph using it.	10M	CO3	L3
(b)	Write the general method of greedy method.	4M	CO3	L2
(OR)				
5(a)	Outline the Floyd-warshall's algorithm for computing shortest paths. Find A^3 for the following digraph. 	7M	CO4	L3

20CS06-DESIGN AND ANALYSIS OF ALGORITHMS

(b)	Illustrate the procedure of Bellman Ford with help of an algorithm.	7M	CO4	L2
(OR)				
6(a)	State the multistage flow graph problem. Find a minimum-cost path from s to t in the following multistage graph using forward approach in dynamic programming.	10M	CO4	L3
				
(b)	Explain about principle of optimality and memorization.	4M	CO4	L2
7(a)	Give a recursive backtracking algorithm for N-queens problem.	4M	CO5	L2
(b)	Construct the portion of the state space tree for 4-Queens problem that is generated to find the positions of 4 queens on a 4X4 chessboard using Backtracking algorithm. Find at least one solution using backtracking.	10M	CO5	L3
(OR)				
8(a)	Draw the portion of the state space tree for sum of subsets problem instance $m=31$ and $w = \{7, 11, 13, 24\}$ using Backtracking algorithm.	7M	CO5	L3
(b)	Present the Hamiltonian and Next Value algorithms used to solve Hamiltonian Cycle problem.	7M	CO5	L2
9.	Apply Branch and Bound algorithm to solve the Traveling salesperson problem instance specified by the following cost matrix. $\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$	14M	CO5	L3
(OR)				
10.	Apply LC Branch and Bound algorithm for the 0/1 knapsack instance of $n=4$; $(p_1, p_2, p_3, p_4) = (10, 10, 12, 18)$; $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$ and $m = 15$.	14M	CO5	L3

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

20FE09-PROBABILITY AND STATISTICS

(ASE,CE & 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)	In a bolt factory machines A, B and C manufacture respectively 20%, 30% and 50% of the total of its output. Of them 5%, 4% and 2% respectively are defective bolts. A bolt is drawn at random from the total output and is found to be defective. What is the probability that it was manufactured by machine B?	7M	CO1	L2												
(b)	If $f(x) = 3x^2$, for $0 < x \leq 1$ is the probability function of a continuous random variable X, then calculate the Mean and Variance of X.	7M	CO1	L2												
(OR)																
2(a)	If A and B are independent events, then prove that (i) A and $\bar{B}$ (ii) $\bar{A}$ and $\bar{B}$, are also independent events.	7M	CO1	L2												
(b)	A random variable x has the following probability distribution <table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>P(x)</td><td>k</td><td>2k</td><td>4k</td><td>2k</td><td>k</td></tr></table> Evaluate the value of k hence determine the mean and variance of the variable X.	x	0	1	2	3	4	P(x)	k	2k	4k	2k	k	7M	CO1	L2
x	0	1	2	3	4											
P(x)	k	2k	4k	2k	k											
(OR)																
3(a)	The number of monthly breakdowns of a computer is a Random Variable having a Poisson distribution with mean equal to 1.3. Find the probability that this computer will function for a month (i) Without a breakdown (ii) With only one breakdown.	7M	CO2	L2												
(b)	If X is a normal variate, find the area A (i) to the left of $z=1.78$ (ii) to the right of $z=-1.45$ (iii) Corresponding to $-0.8 \leq z \leq 1.53$.	7M	CO2	L3												
(OR)																
4(a)	Out of 800 families with 5 children each, how many families would be expected to have (i) three boys (ii) five girls (iii) either 2 or 3 boys.	7M	CO2	L2												
(b)	Find mean and variance of Poisson distribution.	7M	CO2	L2												
(OR)																
5(a)	If the population is 3,6,9,15,27 (i) List all possible samples of size 3 that can be taken without replacement from the finite population. (ii) Find the standard deviation of sampling distribution of means.	7M	CO3	L3												
(b)	When a sample is taken from an infinite population, what happens to the standard error of the mean if the sample size is decreased from 800 to 200.	7M	CO3	L2												
(OR)																

20FE09-PROBABILITY AND STATISTICS

6(a)	To estimate the average amount of time visitors take to move from one building to another in an office complex, the mean of a random sample of size n is used. Given $\sigma = 1.4$ minutes, determine how large should be the sample size if it is ascertained with 99% confidence that the error E is at most 0.25. Also find 98% confidence interval for true mean if the average amount of time taken for this sample is 7 minutes.	7M	CO3	L4																										
(b)	Define and explain population and sample with examples.	7M	CO3	L1																										
7(a)	A reading test results are given for two groups of an elementary school class children. One group consists of 12 Anglo-American children with mean 74 and standard deviation 8. Another group consists of 10 Mexican-American children with mean 70 and standard deviation 10. Is the difference between the means of the two groups significant at 5% level of significance.	7M	CO4	L4																										
(b)	The demand for a particular spare part in a factory was found to vary from day to day. In a sample study the following information was obtained. <table><tr><td>Days</td><td>Mon</td><td>Tue</td><td>Wed</td><td>Thu</td><td>Fri</td><td>Sat</td></tr><tr><td>No. of parts demanded</td><td>1124</td><td>1125</td><td>1110</td><td>1120</td><td>1126</td><td>1115</td></tr></table> Test the hypothesis that the no. of parts demanded does not depend on the day of the week. ($\alpha = 0.01$)	Days	Mon	Tue	Wed	Thu	Fri	Sat	No. of parts demanded	1124	1125	1110	1120	1126	1115	7M	CO4	L4												
Days	Mon	Tue	Wed	Thu	Fri	Sat																								
No. of parts demanded	1124	1125	1110	1120	1126	1115																								
(OR)																														
8(a)	An ambulance service claims that it takes on the average 8.9 minutes to reach its destination in emergency calls. To check this claim, an agency verified a sample of 50 emergency calls, getting a mean of 9.3 minutes with a standard deviation of 1.6minutes. What can they conclude about the claim? (use $\alpha=0.05$)	7M	CO4	L4																										
(b)	In a certain district A, 450 persons were considered regular consumers of Tea out of a sample of 1000 persons. In another district B, 400 were regular consumers of Tea out of a sample of 800 persons. Do the data reveal a significant difference between the two districts as far as Tea drinking habit is concerned? ($\alpha=0.01$).	7M	CO4	L4																										
9(a)	Write the properties of Regression.	7M	CO5	L2																										
(b)	A sample of 12 fathers and their elder sons gave the following data about their elder sons. Calculate the rank correlation coefficient. <table><tr><td>Fathers</td><td>65</td><td>63</td><td>67</td><td>64</td><td>68</td><td>62</td><td>70</td><td>66</td><td>68</td><td>67</td><td>69</td><td>71</td></tr><tr><td>Sons</td><td>68</td><td>66</td><td>68</td><td>65</td><td>69</td><td>66</td><td>68</td><td>65</td><td>71</td><td>67</td><td>68</td><td>70</td></tr></table>	Fathers	65	63	67	64	68	62	70	66	68	67	69	71	Sons	68	66	68	65	69	66	68	65	71	67	68	70	7M	CO5	L3
Fathers	65	63	67	64	68	62	70	66	68	67	69	71																		
Sons	68	66	68	65	69	66	68	65	71	67	68	70																		
(OR)																														
10(a)	The following data pertains to length of service (in years) and. the annual income for a sample of ten employees of an industry. <table><tr><td>Length of Service in Yrs (x)</td><td>6</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td>Annual Income in Thousands(y)</td><td>14</td><td>17</td><td>15</td><td>18</td><td>16</td><td>22</td></tr></table> Compute the correlation coefficient between X and Y.	Length of Service in Yrs (x)	6	8	9	10	11	12	Annual Income in Thousands(y)	14	17	15	18	16	22	7M	CO5	L2												
Length of Service in Yrs (x)	6	8	9	10	11	12																								
Annual Income in Thousands(y)	14	17	15	18	16	22																								
(b)	If $X=2Y+3$ and $Y=kX+6$ are the regression lines of X on Y and Y on X respectively. Show that $0 \leq k \leq 1/2$.	7M	CO5	L2																										

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B.Tech. (IV Semester) Supplementary Examinations

20EC08-ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

(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)	State and prove two Maxwell's equations used for Electrostatic fields.	7M	CO1	L2
(b)	A circular ring of radius 'a' carries a uniform charge ρ_l C/m and is placed on the xy-plane with axis the same as the z-axis (i) Show that $E(0,0,h) = \frac{\rho_l a h}{2\epsilon(h^2+a^2)^{3/2}} a_z$. (ii) What value of h gives the maximum value of E?.	7M	CO2	L3
(OR)				
2(a)	Discuss the evaluation process of Electric field due to (i) A line charge (ii) A surface charge, and (iii) A volume charge.	7M	CO1	L2
(b)	Evaluate the electric flux density (D), inside ($0 < r \leq a$) and outside ($r \geq a$) of a spherical charge of radius 'r=a' with a uniform charge density ρ_0 C/m ³ . Also draw the graph of magnitude of electric flux density (D) vs r.	7M	CO2	L3
3(a)	State and prove differential and integral form of four Maxwell's equations used for time varying fields.	7M	CO1	L2
(b)	Evaluate (i) The displacement current density J_d , (ii) Magnetic field intensity H, and (iii) The frequency ω in free space. Given, $E = 20 \cos(\omega t - 50x) a_y$ V/m.	7M	CO2	L3
(OR)				
4(a)	What is magnetic energy and magnetic energy density? Explain.	7M	CO1	L2
(b)	Apply Ampere's circuit law and obtain the magnetic field intensity H at a general point P due to an infinite conductor, which carries a current of 'I' Amps and it is placed on the z-axis. Assume the point P is 'p' distance away from the conductor.	7M	CO2	L3
5(a)	What is skin depth? Discuss in detail.	7M	CO4	L2
(b)	Evaluate the loss tangent, dielectric constant, and attenuation constant at 1MHz, when a wave is propagating through a nonmagnetic medium has an intrinsic impedance of $240 \angle 30^\circ \Omega$.	7M	CO3	L4
(OR)				
6(a)	Discuss the various parameters involved in the EM wave propagation through free space.	7M	CO4	L2
(b)	Evaluate the ratio conduction current to displacement current, attenuation, Phase and propagation constants, Intrinsic Impedance, wavelength, and Phase velocity, when a wave is propagation through a large copper conductor ($\sigma = 5.8 \times 10^7$ S/m, $\epsilon_r = 1 = \mu_r = 1$) at a frequency 60Hz.	7M	CO3	L4
7(a)	Discuss about (i) Incident wave, (ii) Reflected wave, (iii) Transmitted wave, (iv) Reflection coefficient, and (v) Transmission coefficient, by assuming the EM wave is incident normally on the boundary surface between dielectric-dielectric interface.	7M	CO4	L2
(b)	Obtain the expressions for (i) Reflection coefficient (Γ), (ii) Transmission coefficient (τ), in terms of η_1 , and η_2 , by assuming the EM wave is incident normally on the boundary between dielectric-dielectric interface.	7M	CO3	L3
(OR)				
8(a)	What is Poynting vector? How to Evaluate the time-average power of a Poynting vector? Explain with relevant mathematical expressions.	7M	CO4	L2
(b)	Evaluate the relative permeability (ϵ_r), intrinsic impedance (η), time average power carried by the wave and total power crossing 100 cm ² of plane $2x+y=5$ in a nonmagnetic medium. Given, $E = 4 \sin(2\pi \times 10^7 t - 0.8x) a_z$ V/m.	7M	CO3	L4
9(a)	What are the advantages and disadvantages of stub matching?	7M	CO5	L2
(b)	Derive the expression for input impedance of a transmission line.	7M	CO5	L3
(OR)				
10(a)	Define Reflection coefficient and VSWR. Explain the relation between the two quantities in terms of their definition.	7M	CO5	L2
(b)	Discuss the applications of Smith chart.	7M	CO5	L1

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

20EE11-ELECTRICAL MACHINES-I

(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 construction details of a DC Machine.								7M	CO1	L2																
(b)	Explain the methods of improving commutation.								7M	CO1	L2																
(OR)																											
2(a)	Describe shunt generator with voltage, current and power equations with a neat sketch and mention the applications of shunt generator.								7M	CO1	L2																
(b)	A 100 KW shunt generator is operated at 200V. The stray losses are 1800W and shunt field draws 5A. The armature circuit has a resistance of 0.035 Ω and brush drop is 2.2V. Calculate (i) efficiency at rated load (ii) Maximum efficiency.								7M	CO1	L3																
3.	A 4-pole, 110V, 1000rpm, lap connected, shunt generator with 144 conductors has field resistance of 45Ω. Open circuit characteristics is given below. <table border="1"><tr><td>I_f (A)</td><td>0</td><td>0.5</td><td>1</td><td>1.5</td><td>2</td><td>2.5</td><td>3</td></tr><tr><td>V_{oc} (V)</td><td>5</td><td>50</td><td>85</td><td>102</td><td>112</td><td>116</td><td>120</td></tr></table> Find open circuit voltage and critical field resistance								I _f (A)	0	0.5	1	1.5	2	2.5	3	V _{oc} (V)	5	50	85	102	112	116	120	14M	CO1	L3
I _f (A)	0	0.5	1	1.5	2	2.5	3																				
V _{oc} (V)	5	50	85	102	112	116	120																				
(OR)																											
4(a)	Explain the conditions for voltage build-up in a self-excited DC generator.								7M	CO1	L2																
(b)	Illustrate the characteristics of a DC Series generator.								7M	CO1	L2																
5(a)	Illustrate the Swinburne's test of DC machine and state the advantage and disadvantages.								7M	CO2	L2																
(b)	Discuss the power stages of a DC Motor.								7M	CO2	L2																
(OR)																											
6(a)	Distinguish between Motor and Generator.								7M	CO2	L2																
(b)	The armature resistance of a 200 V shunt motor is 0.4 Ω and no-load armature current is 2 A. When loaded and taking an armature current of 50 A, the speed is 1200 rpm. Find approximately the no load speed.								7M	CO2	L3																
7(a)	Illustrate the construction of a core and shell type single phase transformer.								7M	CO3	L2																
(b)	A 100 kVA, 1100/230 V, 50 Hz single phase transformer has 60 turns on the secondary. Calculate (i) the number of primary turns, (ii) primary and secondary full load currents, (iii) the maximum value of the core flux.								7M	CO3	L3																
(OR)																											
8(a)	Describe the Sumpners test (Back-back test) on transformer with a neat sketch.								7M	CO3	L2																
(b)	Distinguish between power transformer and Distribution transformer.								7M	CO3	L2																
9(a)	Draw open delta or V-V connection circuit diagram, phasor diagram and describe how two transformers connected in open delta can supply three phase power successfully.								10M	CO4	L2																
(b)	Mention the applications of auto transformer.								4M	CO4	L2																
(OR)																											
10(a)	Draw the equivalent circuit of an Auto transformer.								7M	CO4	L2																
(b)	Illustrate the star-star and star-delta connection with their merits and demerits.								7M	CO4	L2																

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B.Tech. (IV Semester) Supplementary Examinations

20CS10-DATA WAREHOUSING AND DATA MINING

Time : 3 hours

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

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)	Demonstrate the efficient processing of OLAP queries.	7M	CO1	L2												
(b)	Describe the types of OLAP servers.	7M	CO1	L2												
(OR)																
2(a)	Discuss Multi-dimensional data models for data Warehouse with neat diagram.	7M	CO1	L2												
(b)	Describe the categories of measures used in computing a data cube with an example.	7M	CO1	L2												
3(a)	Discuss Discretization and Binarization with an example.	7M	CO2	L2												
(b)	Discuss various tasks of data mining with example for each.	7M	CO2	L2												
(OR)																
4(a)	Discuss Feature Subset Selection with neat diagram.	7M	CO2	L2												
(b)	Describe need of data Pre processing, List the steps involved in data preprocessing and Discuss different sampling approaches with example.	7M	CO2	L2												
5(a)	What is Bayesian classifier? Explain Naïve Bayes classifier.	7M	CO3	L3												
(b)	Explain the working principle of Bayesian belief networks. How do they train on sample data?	7M	CO3	L3												
(OR)																
6(a)	How to classify the data using decision tree induction algorithm? Explain what attributes can be considered for classifying email as spam or ham.	7M	CO3	L4												
(b)	Explain the role of attribute selection measures in decision tree construction with suitable examples.	7M	CO3	L3												
7(a)	What do you mean by frequent item set, Closed item set? Explain with example.	7M	CO4	L3												
(b)	Compare and contrast FP-Growth algorithm with Apriori algorithm.	7M	CO4	L4												
(OR)																
8(a)	Discuss the following terms with example (i) Rule-Generation (ii) Frequent Item set Generation	4M	CO4	L2												
(b)	Apply Apriori Principle to generate frequent item sets and strong association rules for the given data set with support = 50% and Confidence = 60%. <table><tr><td>TID</td><td>ITEMS</td></tr><tr><td>100</td><td>{1,3,4}</td></tr><tr><td>200</td><td>{2,3,5}</td></tr><tr><td>300</td><td>{1,2,3,5}</td></tr><tr><td>400</td><td>{2,5}</td></tr><tr><td>500</td><td>{2,3}</td></tr></table>	TID	ITEMS	100	{1,3,4}	200	{2,3,5}	300	{1,2,3,5}	400	{2,5}	500	{2,3}	10M	CO4	L3
TID	ITEMS															
100	{1,3,4}															
200	{2,3,5}															
300	{1,2,3,5}															
400	{2,5}															
500	{2,3}															
9(a)	Discuss DBSCAN Algorithm with example.	7M	CO5	L3												
(b)	Suppose that our task is to cluster data points into two clusters. Let the data points are:{2, 4, 10, 12, 3, 20, 30,11, 25}. Let 2 and 4 are initial cluster centroids. Apply two rounds of K-means algorithm and find a set of clusters. Use Euclidean distance as the measure.	7M	CO5	L3												
(OR)																
10(a)	What is cluster analysis? Describe different types of clusterings.	7M	CO5	L2												
(b)	Discuss agglomerative hierarchical clustering with example.	7M	CO5	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. (IV Semester) ~~Regular~~/Supplementary Examinations**20AE05-AEROSPACE MATERIALS AND MANUFACTURING**

(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)	Describe the mechanism of grain formation in metals and alloys.	7M	CO1	L2
(b)	Recall the significance of the valency factor in Hume-Rothery rules for the formation of solid solutions.	7M	CO1	L3
(OR)				
2	Calculate the atomic packing factor for a closed-packed hexagonal (HCP) structure.	14M	CO1	L3
3(a)	Difference between isomorphous and eutectic equilibrium diagrams with example.	7M	CO2	L3
(b)	Illustrate the crystal structure of pure copper with mechanical properties.	7M	CO2	L2
(OR)				
4(a)	Compare the mechanical properties of malleable cast iron and spheroidal graphite cast iron.	7M	CO2	L2
(b)	Draw a hypothetical phase diagram A-B with the help of the following data: (i) Melting point of A = 1100°C (ii) Melting point of B = 800°C (iii) Eutectic reaction occurs at 500°C at 40% B composition. (iv) Maximum solubility at 500°C of B in A and A in B at a eutectic temperature of 20% and 10% respectively, which drops down to 300°C at 10 atomic % in A, 5 atomic % in B. Label the phase diagram, Explain the structural changes of 25% B alloy when cooled from liquid state to room temperature.	7M	CO2	L4
5(a)	Distinguish the continuous casting process in detail with molten metal solidified.	7M	CO3	L2
(b)	List out the different patterns used in casting Include examples.	7M	CO3	L2
(OR)				
6(a)	How are engineering materials classified? Provide examples of materials in each category.	4M	CO3	L2
(b)	Demonstrate the main stages of creating a metal casting process.	10M	CO3	L2
7(a)	Identify the advantages of drop forging over smith forging.	7M	CO4	L2
(b)	Different types of welded joints and their typical applications.	7M	CO4	L2
(OR)				
8(a)	Demonstrate the working process of friction welding with advantages.	7M	CO4	L2
(b)	Examine the advantages and limitations of hot extrusion and cold extrusion.	7M	CO4	L2
9(a)	Compare the working process of shaping and planning machines with differences in terms of motion and application.	7M	CO5	L2
(b)	Illustrate the essential components of a lathe machine and provide a clear diagram.	7M	CO5	L2
(OR)				
10	Explore the operational principle of Ultrasonic Machining (USM) and elucidate the role of ultrasonic vibration in facilitating material removal during the machining process.	14M	CO5	L2

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

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

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

20CE09 – HYDRAULICS AND HYDRAULIC MACHINERY SYSTEMS

(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)	Derive an expression for the discharge through a channel by Chezy's formula and analyze.	7M	CO1	L2
(b)	A trapezoidal channel discharging water at the rate of 150 m ³ /sec is to be designed for minimum cross-sectional area. Find the bottom width of the channel and depth of water. The side slope is 45°. Take bed slope as 1 in 1000 and C = 50.	7M	CO1	L3
(OR)				
2(a)	Find velocity, rate of flow through a rectangular channel of 6 m wide and 3 m deep, when it is running full. The channel is having a bed slope as 1 in 2000. Take Chezy's constant C = 55 analyze.	7M	CO1	L3
(b)	What is the fundamental difference between flow through pipe and flow through open channel?	7M	CO1	L2
3(a)	The discharge of water through a rectangular channel of width 8m, is 15 m ³ /s when depth of flow is 1.2 m, calculate the following terms: (i) specific energy of the flowing water (ii) critical depth and critical velocity (iii) value of minimum specific energy.	10M	CO1	L3
(b)	Explain about different types of slopes.	4M	CO2	L1
(OR)				
4.	Define hydraulic jump. Explain various types hydraulic jump. Derive the head loss in hydraulic jump.	14M	CO2	L2
5(a)	Prove that the force exerted by a jet of water on a fixed semi-circular plate in the direction of jet when the plate strikes the center of the semi-circular is two times the force exerted by the jet on a fixed vertical plate. Evaluate.	7M	CO3	L3
(b)	A jet of water of diameter 50 mm, having a velocity of 30 m/s. strikes a curved vane which is moving with a velocity of 15 m/s in the direction of jet. The jet leaves the vane at an angle 60°, to the direction of motion of vanes at outlet. Determine: i) force exerted by the jet on the vane in the direction of motion ii) worked done per second by the jet. Evaluate.	7M	CO3	L3
(OR)				
6(a)	Show that the efficiency of a free jet striking normally as series of flat plates mounted on the periphery of a wheel never exceed 50%.	7M	CO3	L2
(b)	A jet of water having a velocity of 35 m/s strikes a series of radial curved vanes mounted on a wheel. The wheel has 200 rpm. The jet makes 20° with the tangent to wheel at inlet and leaves the wheel with a velocity of 5 m/s at 130° to tangent to the wheel at outlet. The diameters of wheel are 1 m and 0.5 m. find (i) vane angles at inlet and outlet for radically outward flow turbine. (ii) work done (iii) efficiency of the system.	7M	CO3	L3

20CE09 – HYDRAULICS AND HYDRAULIC MACHINERY SYSTEMS

7(a)	By means of a neat sketch, explain the governing mechanism of a turbine.	7M	CO4	L2
(b)	A Pelton wheel is to be designed for the following specifications; shaft power = 11,775 KW; head 400 m; speed 750 r.p.m.; Overall efficiency = 87%; jet diameter is not to exceed one-sixth of wheel diameter. Determine the wheel diameter, the number of jets required and diameter of jet. Take $K_{v1} = 0.985$, $K_{u1} = 0.45$.	7M	CO4	L3
(OR)				
8(a)	Define the term unit power, unit speed and unit discharge with reference to a hydraulic turbine. And also derive the expression for these terms.	7M	CO4	L2
(b)	A Kaplan turbine develops 25000 kW power at an average head of 50 meter. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.4 times the diameter of the runner and an overall efficiency of 89%, calculate the diameter, speed and specific speed of specific speed of the turbine.	7M	CO4	L3
9(a)	Explain the difference between single-stage and multistage pumps? Describe multistage pump with: (i) Impellers in parallel. (ii) Impellers in series.	7M	CO4	L2
(b)	The diameter of a centrifugal pump, which is discharging 0.035 m ³ /s of water against a total head of 25 m is 0.05 m the pump is running at 1200 rpm. Find the head, discharge and ratio of power of a geometrically similar pump of diameter 0.3 m when it is running at 2000 rpm.	7M	CO4	L3
(OR)				
10(a)	A double acting reciprocating pump, running at 45 r.p.m., is discharging 1.5 m ³ of water per minute. The pump has a stroke of 450 mm. the diameter of piston is 225 mm. the delivery and suction head are 22 m and 7 m respectively. Find the slip of the pump and power required to drive the pump.	7M	CO4	L3
(b)	List the main component parts of a centrifugal pump and explain them briefly.	7M	CO4	L2

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

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

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

20EC06-DIGITAL SIGNAL PROCESSING

(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)	Describe the block diagram of DSP system along with its merits and demerits.	7M	CO1	L2
(b)	Determine the linear convolution response of the DT system if input $x(n) = \{3, 2, 1, 2\}$ and system impulse response $h(n) = \{1, 2, 1, 2\}$.	7M	CO2	L3
(OR)				
2(a)	Discuss the classification of discrete time systems with relevant examples.	7M	CO1	L2
(b)	Compute the frequency, magnitude and phase response of the DT system described by difference equation $y(n) = 0.5x(n) + 0.5x(n-2)$.	7M	CO3	L3
3(a)	Summarize the concept of ROC of Z-Transforms along with properties.	7M	CO1	L2
(b)	Illustrate the Z-Transform and ROC of the following signals (i) $x(n) = a^n u(n)$ (ii) $x(n) = -a^n u(-n-1)$.	7M	CO2	L3
(OR)				
4(a)	Examine the time shifting and time reversal properties of the Z-Transform.	7M	CO2	L2
(b)	Obtain the Direct Form-I and Direct Form-II realizations of the system described by LCCDE $y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$ using Z-Transform.	7M	CO3	L3
5(a)	Compute the DFT of the sequence $x(n) = \{1, 2, 3, 4\}$ for $N = 4$ and plot its Magnitude and Phase response.	7M	CO2	L3
(b)	Determine the circular convolution between $x_1(n) = \{1, 2, 0, 1\}$ and $x_2(n) = \{2, 2, 0, 1\}$.	7M	CO2	L3
(OR)				
6(a)	Infer the linearity and periodicity properties of the DFT.	7M	CO2	L3
(b)	Calculate the 8-point DFT of the sequence $X(n) = \{1, 1, 1, 1, 0, 0, 0, 0\}$ using DIT-FFT algorithm.	7M	CO2	L3
7(a)	Contrast the steps in design of IIR filters using Chebyshev-I approximation method.	7M	CO4	L3
(b)	Determine the transfer function of the digital filter $H(z)$ using impulse invariant method for given analog transfer function $H(s) = \frac{2}{(s+1)(s+2)}$ (Assume $T = 1$ sec)	7M	CO4	L3
(OR)				
8.	Design a Digital Butterworth IIR LPF using the bilinear transformation to meet the following digital filter specifications $0.707 \leq H(j\omega) \leq 1.0 \quad 0 \leq \omega \leq \pi/2$ $H(j\omega) \leq 0.2 \quad 3\pi/4 \leq \omega \leq \pi$	14M	CO4	L3
9(a)	Compare IIR and FIR filters.	7M	CO1	L2
(b)	Summarize the steps involved in design of FIR digital filters using Fourier series method.	7M	CO4	L3
(OR)				
10.	Design a digital FIR low pass filter with $H_d(e^{j\omega}) = e^{-j\omega\alpha} - \frac{\pi}{4} \leq \omega \leq \frac{\pi}{4}$ $0, \text{ otherwise}$ using Hamming window with $N=7$	14M	CO4	L3

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

20EE08-POWER SYSTEMS-I

(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)	Explain the principle of operation of nuclear reactor with neat diagram.	7M	CO1	L2
(b)	What are the factors for selection of the site for nuclear power stations?	7M	CO1	L2
(OR)				
2(a)	Discuss the principle of operation about Gas turbine power plant with neat diagram.	7M	CO1	L2
(b)	Explain the function of following components of Hydroelectric Power Plant. (i) Dam (ii) Reservoir (iii) Trash Rack (iv) Forebay (v) Surge Tank (vi) Spillway (vii) Penstock.	7M	CO1	L2
3(a)	Explain the following terms i) Connected load ii) maximum demand iii) demand factor iv) load factor	7M	CO2	L3
(b)	Explain base load and peak load plants.	7M	CO2	L2
(OR)				
4(a)	What do you understand by tariff? Discuss the objectives of tariff.	7M	CO2	L3
(b)	Describe the desirable characteristics of a tariff.	7M	CO2	L3
5(a)	Why is electrical energy preferred over other forms of energy ?	7M	CO3	L2
(b)	A single phase distributor 2 kilometres long supplies a load of 120 A at 0.8 p.f.lagging at its far end and a load of 80 A at 0.9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at the far end. The resistance and reactance per km are 0.05Ω and 0.1Ω respectively. If the voltage at the far end is maintained at 230 V, calculate: (i) voltage at the sending end (ii) phase angle between voltages at the two ends.	7M	CO3	L3
(OR)				
6(a)	Distinguish between Underground cables and overhead lines.	7M	CO3	L2
(b)	Explain the construction of underground cables.	7M	CO3	L2
7(a)	What is a sag in overhead lines? Discuss the disadvantages of providing too small or too large sag on a line.	7M	CO4	L3
(b)	Deduce an approximate expression for sag in overhead lines when (i) supports are at equal levels (ii) supports are at unequal levels.	7M	CO4	L3
(OR)				
8(a)	Explain various methods of improving string efficiency.	7M	CO4	L3
(b)	An overhead transmission line at a river crossing is supported from two towers at heights of 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg, find the clearance between the conductor and water at a point mid-way between the towers. Weight of conductor is 1 kg/m.	7M	CO4	L3
9(a)	What are the factors affecting corona? Derive the expressions for critical disruptive and visual critical voltage.	7M	CO5	L2
(b)	Discuss the various conductor materials used for overhead lines. What are their relative advantages and disadvantages.	7M	CO5	L3
(OR)				
10(a)	Discuss the advantages and disadvantages of pin-type insulators.	7M	CO5	L2
(b)	Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 kV, calculate the line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is 1/8th of the capacitance of the insulator itself. Also find the string efficiency.	7M	CO5	L2

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

B.Tech. (IV Semester) Supplementary Examinations

20ME07-APPLIED THERMODYNAMICS

(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)	Derive an expression for the efficiency of a Rankine cycle with P-V and T-S diagrams.	7M	CO1	L2
(b)	A simple Rankine cycle works between pressures 28 bar and 0.06 bar. The initial condition of steam being dry saturated. Calculate the cycle efficiency, work ratio and specific steam consumption.	7M	CO1	L3
(OR)				
2(a)	Illustrate the regenerative cycle and list its merits and demerits.	7M	CO1	L2
(b)	Compare the merits and demerits of liquid fuels over gaseous fuels.	7M	CO1	L1
(OR)				
3(a)	Illustrate the working principle of a Babcock and Wilcox boiler.	7M	CO2	L2
(b)	What do you mean by boiler mountings and accessories? List all the mountings and accessories used in boilers.	7M	CO2	L1
(OR)				
4(a)	Derive an expression for the height of chimney with suitable sketch.	7M	CO2	L2
(b)	Determine the draught produced in cm of water by a chimney of 50 meters height when the temperature of the flue gases passing through the chimney is such that the mass of flue gases discharge is maximum in the given time. The ambient temperature is 20 °C.	7M	CO2	L3
(OR)				
5(a)	Justify the importance of nozzles in a steam power plant cycle.	7M	CO3	L1
(b)	Inlet pressure and temperature of steam nozzles are 10 bar and 200°C respectively. The exit pressure of steam nozzle is 0.5 bar. Evaluate the mass flow rate of steam if throat diameter is 12 mm.	7M	CO3	L3
(OR)				
6(a)	List various surface condensers and illustrate the working of Evaporative surface condenser.	7M	CO3	L2
(b)	Differentiate between the jet and surface condensers.	7M	CO3	L2
(OR)				
7(a)	Illustrate the working principle of simple impulse turbine.	7M	CO4	L2
(b)	The velocity of steam exiting the nozzles of the impulse stage of a turbine is 400 m/s. The blades operate close to the maximum blading efficiency. The nozzle angle is 20°. Considering equiangular blades and neglecting blade friction, calculate for a steam flow of 0.6kg/s, the power developed and the diagram efficiency.	7M	CO4	L3
(OR)				
8(a)	Define degree of reaction and prove that degree of reaction is 50% for the Parson's reaction turbine.	7M	CO4	L2
(b)	Differentiate between impulse turbine and reaction turbine.	7M	CO4	L2
(OR)				
9(a)	Derive an expression for work done for a single-stage single-acting reciprocating air compressor without clearance volume.	7M	CO5	L2
(b)	Classify the compressors and discuss about the Roots blower with a neat sketch.	7M	CO5	L1
(OR)				
10(a)	Explain the working principle of axial flow compressor.	7M	CO5	L2
(b)	Differentiate between the reciprocating and axial flow compressors.	7M	CO5	L2

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

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

20CS11-OPERATING SYSTEMS

(AI&DS,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)	Discuss about operating system interfaces.	7M	CO1	L2																								
(b)	Discuss abstract view of the operating system with neat sketch.	7M	CO1	L2																								
(OR)																												
2(a)	Compare Simple and Kernel approaches of Operating System structure	7M	CO1	L2																								
(b)	Describe the services of operating system with neat sketch.	7M	CO1	L2																								
(OR)																												
3(a)	Describe the criteria followed for choosing CPU scheduling algorithm.	7M	CO2	L2																								
(b)	Describe various Inter Process Communication models.	7M	CO2	L2																								
(OR)																												
4(a)	Consider the following processes with an arrival time and CPU burst times. <table border="1"><tr><td>Process ID</td><td>CPU Burst Time</td></tr><tr><td>P1</td><td>10</td></tr><tr><td>P2</td><td>1</td></tr><tr><td>P3</td><td>5</td></tr><tr><td>P4</td><td>3</td></tr><tr><td>P5</td><td>2</td></tr></table> Draw the gantt chart and calculate Turnaround time, waiting time, average waiting time, average turnaround time of above processes using Round Robin Scheduling algorithm with time quantum 4.	Process ID	CPU Burst Time	P1	10	P2	1	P3	5	P4	3	P5	2	7M	CO2	L3												
Process ID	CPU Burst Time																											
P1	10																											
P2	1																											
P3	5																											
P4	3																											
P5	2																											
(b)	Discuss about process states and process control block with neat sketch.	7 M	CO2	L2																								
(OR)																												
5.	Consider the system with the 10 instances of resource type A,5 instances of resource type B and 7 instances of resource type C and snapshot of information related to resources allocation, max and available indicated below <table border="1"><tr><td>Process Name</td><td>Allocation</td><td>Max</td><td>Available</td></tr><tr><td></td><td>A B C</td><td>A B C</td><td>A B C</td></tr><tr><td>P0</td><td>0 1 0</td><td>7 5 3</td><td rowspan="5">3 3 2</td></tr><tr><td>P1</td><td>2 0 0</td><td>3 2 2</td></tr><tr><td>P2</td><td>3 0 2</td><td>9 0 2</td></tr><tr><td>P3</td><td>2 1 1</td><td>2 2 2</td></tr><tr><td>P4</td><td>0 0 2</td><td>4 3 3</td></tr></table> Apply the Banker's algorithm to find the 1. Need matrix of each process? 2. Safe state sequence.	Process Name	Allocation	Max	Available		A B C	A B C	A B C	P0	0 1 0	7 5 3	3 3 2	P1	2 0 0	3 2 2	P2	3 0 2	9 0 2	P3	2 1 1	2 2 2	P4	0 0 2	4 3 3	14M	CO3	L3
Process Name	Allocation	Max	Available																									
	A B C	A B C	A B C																									
P0	0 1 0	7 5 3	3 3 2																									
P1	2 0 0	3 2 2																										
P2	3 0 2	9 0 2																										
P3	2 1 1	2 2 2																										
P4	0 0 2	4 3 3																										
(OR)																												

20CS11-OPERATING SYSTEMS

6(a)	Compare and contrast the semaphores and monitors	7M	CO3	L2
(b)	Describe critical section problem and Peterson's solutions to the critical section problem.	7M	CO3	L2
7(a)	Discuss segmentation with neat sketch.	7 M	CO4	L2
(b)	Consider the available memory partitions of 100kb, 500 kb, 200 kb, 300kb, and 600 kb. Apply the best, worst, first fit algorithm to place processes with the sizes of 212kb, 417 kb, 112Kb, 426 Kb in order and explain that which is the suitable algorithm with minimum fragmentation.	7 M	CO4	L3
(OR)				
8(a)	Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Calculate the number of page faults occurred for the above page reference string using FIFO page replacement algorithm. Assume that three frames are available in physical memory and initially all frames are free.	7M	CO4	L3
(b)	Summarize the need of swapping in memory management with neat sketch.	7M	CO4	L2
9(a)	Summarize file implementation with advantages and limitations.	7M	CO5	L2
(b)	Describe about file system structure.	7M	CO5	L2
(OR)				
10(a)	Discuss about file system implementation.	7M	CO5	L3
(b)	Describe the overview of mass-storage structure.	7 M	CO5	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. (IV Semester) ~~Regular~~/Supplementary Examinations**20AE06-AERODYNAMICS**

(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)	The lift on spinning circular cylinder in a freestream with a velocity of 30 m/s and at standard sea level conditions is 6N/m of span. Calculate the circulation around the cylinder.	4M	CO1	L3
(b)	Derive the equation of streamline passing through stagnation points of non-lifting flow over a circular cylinder.	10M	CO1	L3
(OR)				
2(a)	Derive the coordinates for location of stagnation point of Rankine's half-body.	7M	CO1	L3
(b)	According to inviscid theory, the drag of any body of any shape immersed in a uniform stream is identically zero. Justify the statement.	7M	CO1	L2
(OR)				
3(a)	Transformation of the uniform flow parallel to the x-axis of the physical plane, with the transformation function $\zeta = z^2$.	7M	CO2	L3
(b)	Show that the shape of the trailing edge of Joukowski airfoil is cusped.	7M	CO2	L3
(OR)				
4.	A cambered aerofoil is obtained by transforming a circle of radius 'a' with Kutta-Joukowski transformation function. Find out the coordinates of cambered airfoil profile in the transformed plane.	14M	CO2	L3
(OR)				
5(a)	Show that center of pressure and aerodynamics center are both at quarter chord point in the case of thin symmetrical airfoil as per thin aerofoil theory.	7M	CO3	L3
(b)	State and explain Kutta condition.	7M	CO3	L2
(OR)				
6.	Derive coefficient of lift expression for cambered airfoil using thin airfoil theory. Hint: $\frac{1}{2\pi} \int_0^c \frac{\gamma(\xi)d\xi}{(x-\xi)} = V_\infty \left[\alpha - \frac{dz}{dx} \right]$ $\gamma(\theta) = 2V_\infty \left(A_0 \frac{1+\cos\theta}{\sin\theta} + \sum_{n=1}^{\infty} A_n \sin n\theta \right)$	14M	CO3	L3

20AE06-AERODYNAMICS

7(a)	Derive the relation for velocity induced at a point by an infinite straight vortex filament using Biot-Savart law.	4M	CO4	L3
(b)	Consider a potential flow over a finite wing with elliptic circulation distribution. The circulation at the origin is $100\text{m}^2/\text{s}$. The wing span is 4 m. The freestream velocity is 100 m/s. Determine the induced angle of attack. Use the standard notions in the solution	10M	CO4	L3
(OR)				
8(a)	Show that the downwash is constant over the span for an elliptical lift distribution.	7M	CO4	L3
(b)	Derive the expression for induced angle of attack for elliptical lift distribution over finite wing.	7M	CO4	L3
9(a)	Illustrate the Karman's analysis of flat plate boundary layer for determining shear stress.	7M	CO5	L3
(b)	Derive the expression for Momentum thickness for boundary layer flow.	7M	CO5	L3
(OR)				
10(a)	If the velocity profile in boundary layer is given by $u/U = y/\delta$. Where u is the velocity at y and $u \rightarrow U$ (freestream velocity) as $y \rightarrow \delta$ (boundary layer thickness). Calculate Displacement thickness.	4M	CO5	L3
(b)	Consider an incompressible boundary layer with freestream velocity $U = \text{constant}$. Assuming the velocity distribution $u/U = 2(y/\delta) - (y/\delta)^2$, where ' u ' is the velocity at y and $u \rightarrow U$ (freestream velocity) as $y \rightarrow \delta$ (boundary layer thickness). Determine the expression for boundary layer thickness.	10M	CO5	L3

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

L.B.Reddy Nagar:: Mylavaram – 521230 :: NTR Dist.:: A.P.

B.Tech. (IV Semester) ~~Regular~~ & Supplementary Examinations

20CE10-GEOTECHNICAL 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)	A soil specimen has a water content of 10% and a wet unit weight of 20kN/m^3 . If the specific gravity of solids is 2.70, determine the dry unit weight, void ratio and degree of saturation. Take $\gamma_w = 10\text{kN/m}^3$.	7M	CO1	L3
(b)	Explain the Step by Step Procedure to Grain size Distribution Curve in laboratory test.	7M	CO1	L2
(OR)				
2(a)	Illustrate three Phase diagram with a neat Sketch.	4M	CO1	L2
(b)	Discuss the Unified Soil Classification System in detail.	10M	CO1	L2
3 (a)	Define the following (i)Liquid limit (ii) plastic limit (iii) Shrinkage limit and also draw the consistency limit	7M	CO2	L1
(b)	A soil sample of the following properties liquid limit of 93% and Plastic limit of 46% and classify the soil according to Indian standard system.	7M	CO2	L2
(OR)				
4(a)	List out the field compaction methods? Write any three in detail.	7M	CO2	L1
(b)	Draw the neat sketch of compaction test of zero-air void line and explain briefly.	7M	CO2	L2
5(a)	In a falling head permeameter if the time interval for dropping from h_1 to h_2 and h_2 to h_3 . Find the relationship between them.	7M	CO3	L3
(b)	A permeameter of a 2-layered soil sample of length 300mm. If 200mm thick soil having $k_1 = 4 \times 10^{-6} \text{mm/sec}$ and underlain by 100mm thick soil with $k_2 = 3.5 \times 10^{-6} \text{mm/sec}$. Determine the flow parallel and perpendicular to plane stratification soils.	7M	CO3	L3
(OR)				
6(a)	Explain the quick sand condition and also derive the expression for critical hydraulic gradient.	7M	CO3	L2
(b)	A flow net analysis was performed for estimating the seepage loss through the foundation of a cofferdam, results of the flow net analysis give a number of flow line is 6 and number of drop is 16. assume the coefficient of permeability of the soil is $4 \times 10^{-5} \text{m/min}$. Estimate the quantity of seepage loss per meter of the cofferdam per day. Also estimate the exit gradient if the average length of the last flow field is 0.9m.	7M	CO3	L3

20CE10-GEOTECHNICAL ENGINEERING

7(a)	Discuss the vane shear test.	7M	CO3	L2
(b)	A shear vane of 7.5 cm in diameter and 11.0cm in length was used to measure the shear strength of soft clay .If a torque of 600N-m was required to shear the soil, Calculate the shear strength of the soil.	7M	CO3	L3
(OR)				
8(a)	Illustrate the important relationship obtained from the Mohr circle.	7M	CO3	L3
(b)	Explain the coulomb equation and Mohr-coulomb's criterion.	7M	CO3	L2
(OR)				
9(a)	Describe the Boussinesq's theories assumption and limitations.	7M	CO4	L2
(b)	Determine the vertical stress at a point P which is 3m below and at a radial distance of 3m from vertical load of 100kN.Use Westergaard equation.	7M	CO4	L3
(OR)				
10(a)	Explain the terms (i) Primary consolidation (ii) Secondary consolidation.	7M	CO4	L2
(b)	A clay stratum 5m thick has the initial void ratio of 1.50 and effective over burden pressure of 120kN/m ² . When the sample is subjected to an increase of pressure 120kN/m ² ,the void ratio reduce to 1.44.Determine the coefficient of the volume compressibility and final settlement of the stratum.	7M	CO4	L3

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

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

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

20EE09-CONTROL SYSTEMS

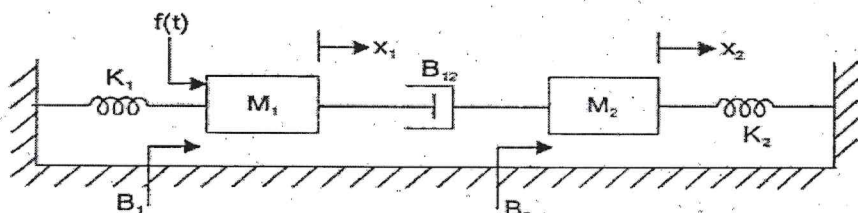
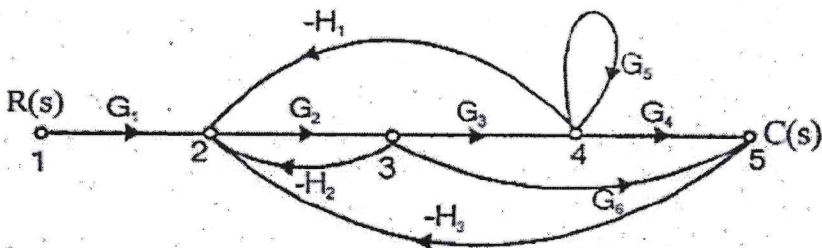
(ECE & EEE)

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 Block diagram reduction rules used for obtaining transfer function.	7M	CO1	L2
(b)	Obtain the transfer functions $\frac{X_1(S)}{F(S)}$, $\frac{X_2(S)}{F(S)}$ for the system shown 	7M	CO1	L3
(OR)				
2(a)	Explain open loop and closed loop system with suitable example.	7M	CO1	L2
(b)	Obtain the closed loop transfer function for the given signal flow graph using Mason's gain formula 	7M	CO1	L3
3(a)	A system has open loop transfer function $G(s) = \frac{10}{(s+2)(s+3)}$. Find the steady state error constants and steady state errors.	7M	CO2	L3
(b)	A unity feedback control system has an open loop transfer function $G(s) = \frac{10}{s(s+2)}$. Find the rise time, percentage overshoot, peak time and settling time for a unit step input.	7M	CO2	L3
(OR)				
4.	Derive the response of second order un-damped system for the unit step input. Also derive time domain specification parameters.	14M	CO2	L3

20EE09-CONTROL SYSTEMS

5(a)	Discuss the procedure for analyzing the stability of system using Routh-Hurwitz criterion.	7M	CO2	L2
(b)	Construct Routh array and determine stability of system represent by the characteristic equation $s^5+2s^4+2s^3+4s^2+s+2=0$.	7M	CO2	L4
(OR)				
6.	Sketch the root locus for the unity feedback system whose open loop transfer function is $G(S) = \frac{K}{s(s+1)(s+2)(s+3)}$. Also obtain the limiting value of K for system stability.	14M	CO2	L3
7(a)	Recall the transfer function and pole zero plot of Lag Compensator.	7M	CO4	L1
(b)	Sketch the polar plot for given type 1 and order 3 system $\frac{1}{s(1+sT_1)(1+sT_2)}$	7M	CO3	L3
(OR)				
8.	Sketch the Bode plot for the following transfer function and determine gain cross over frequency, phase cross over frequency, GM and PM $G(S) = \frac{100}{s(1+0.1s)(1+0.01s)}$	14M	CO3	L3
9(a)	Construct state observable canonical space model of a given system $G(S) = \frac{s+1}{s^3+10s^2+5s+10}$.	7M	CO1	L3
(b)	Evaluate the controllability and observability of the system with $\dot{X} = AX + BU$ with $A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$; $B = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ $C = [0 \quad 1]$	7M	CO1	L3
(OR)				
10(a)	State and prove the properties of state transition matrix.	7M	CO1	L3
(b)	Obtain the state transition matrix for the system having state model $\dot{X}(t) = AX(t) + BU(t)$, $Y(t) = CX(t) + DU(t)$ $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 3 \end{bmatrix}$ $C = [1 \quad 3]$ $D = [0]$	7M	CO1	L3

H.T.No									
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21 APR 2026

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

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

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

20ME08-PRODUCTION TECHNOLOGY

(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 and explain various allowances needed for pattern preparation.	7M	CO1	L2
(b)	Define core. Enumerate and explain the types of cores used in casting.	7M	CO1	L2
(OR)				
2(a)	Explain centrifugal casting process with neat sketch.	7M	CO1	L2
(b)	Enumerate and explain the types of risers used in casting process.	7M	CO1	L2
(OR)				
3(a)	Discuss the classification of welding processes.	7M	CO2	L1
(b)	Explain submerged arc welding and list its advantages over other welding processes.	7M	CO2	L2
(OR)				
4(a)	Illustrate the process of MIG welding and list its applications.	7M	CO2	L2
(b)	Describe the procedure and the equipment used in arc welding.	7M	CO2	L2
(OR)				
5(a)	Define resistance welding and explain the principle of resistance welding.	7M	CO3	L2
(b)	With a neat sketch, explain the friction welding.	7M	CO3	L2
(OR)				
6(a)	Elaborate essential steps in brazing operation.	7M	CO3	L2
(b)	Elaborate various defects that occur after welding.	7M	CO3	L2
(OR)				
7(a)	What is coining? Explain the process with the help of a neat sketch.	7M	CO4	L2
(b)	Illustrate Upset forging process and outline its applications.	7M	CO4	L2
(OR)				
8(a)	Explain smith forging and closed die forging.	7M	CO4	L2
(b)	Exemplify various defects that usually occur in forging.	7M	CO4	L2
(OR)				
9(a)	With the help of neat sketches, explain the drawing operations.	7M	CO5	L2
(b)	Differentiate embossing operation with coining operation.	7M	CO5	L2
(OR)				
10(a)	Explain the impact extrusion with neat sketch.	7M	CO5	L2
(b)	Sketch and explain the stretch forming processes.	7M	CO5	L2

H.T.No									
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22 APR 2026

R20

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

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

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

**20AD03-INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
(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)	Discuss history and state of the art of Artificial Intelligence.	7M	CO1	L2
(b)	Explain goal and learning based agents with diagram.	7M	CO1	L2
(OR)				
2(a)	Define agent. Describe agent program with example.	7M	CO1	L2
(b)	Illustrate condition and action rule based agents with diagrams.	7M	CO1	L2
(OR)				
3(a)	Define Searching. Illustrate Problem formulation steps.	7M	CO2	L3
(b)	Demonstrate any one blind searching techniques with example.	7M	CO2	L3
(OR)				
4(a)	Illustrate Searching properties along with examples.	7M	CO2	L3
(b)	Demonstrate the AO * algorithm, using a suitable example.	7M	CO2	L3
(OR)				
5(a)	What is the significance of knowledge representation? Give differences between database and knowledge base.	7M	CO3	L2
(b)	Distinguish between proposition logic & predicate logic.	7M	CO3	L2
(OR)				
6(a)	Explain backward chaining with example.	7M	CO3	L2
(b)	Discuss the Mental events and Mental Objects.	7M	CO3	L2
(OR)				
7.	What is Data science? Explain 6 steps Data science process.	14M	CO4	L2
(OR)				
8(a)	Discuss Boolean and fancy Indexing with examples.	7M	CO4	L2
(b)	Explain Operations between arrays and scalars with examples.	7M	CO4	L2
(OR)				
9(a)	Discuss the Data Structures of Pandas with examples.	7M	CO5	L2
(b)	Describe the concept of Reindexing with examples.	7M	CO5	L2
(OR)				
10(a)	Discuss any 7 features of pandas.	7M	CO5	L2
(b)	Discuss the following concepts (i) Descriptive Statistics (ii) Filtering.	7M	CO5	L2

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

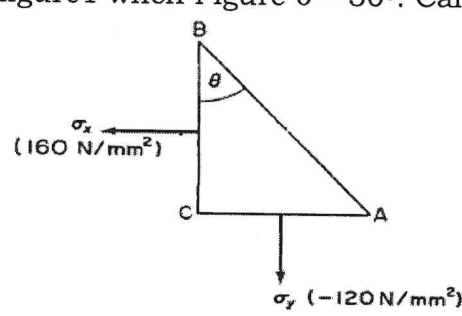
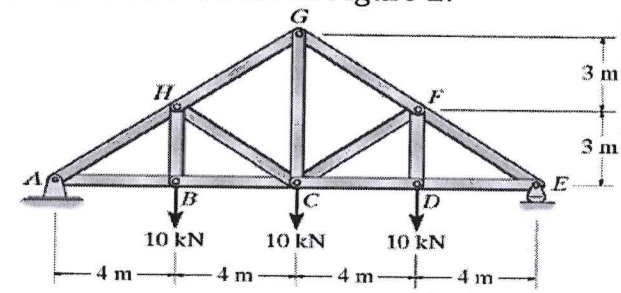
**20AE07-AIRCRAFT STRUCTURES-I
(ASE)**

Time : 3 hours

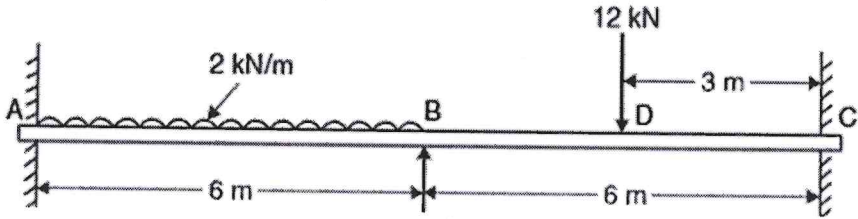
Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	At a point in a elastic material the normal stresses on two mutually perpendicular planes are 70 N/mm ² tensile and 50N/mm ² compressive. These planes also carry shear stresses of 55 N/mm ² .Determine the principal planes and principal stresses.	7M	CO1	L3
(b)	Draw the Mohr's circle of stress for the system shown in figure1 when Figure $\theta = 30^\circ$. Calculate maximum shear stress.  fig.1	7M	CO1	L3
(OR)				
2(a)	Analyze the equations of compatibility for three-dimensional body in elasticity.	7M	CO1	L4
(b)	The stresses at a point on a strained material is subjected to $\sigma_1=150$ N/mm ² (Tensile), $\sigma_2=100$ N/mm ² (Tensile) on two mutually perpendicular directions. Determine normal, tangential and resultant stresses on a inclined plane with angle $\theta=45^\circ$ using Mohr's circle method.	7M	CO1	L3
3.	Analyze the given frame and determine the forces in the members of the Truss shown in Figure 2.  fig.2	14M	CO2	L4
(OR)				
4(a)	Explain clearly the difference between statically determinate and statically indeterminate Structure.	4M	CO2	L2
(b)	Calculate the forces in member GF,CF and CD from figure 2 by using method of sections.	10M	CO2	L3

20AE07-AIRCRAFT STRUCTURES-I

5(a)	Analyze the beam ABC of length 16 m consists of spans AB and BC each 8 m long and simply supported at A, B and C. the beam carries a UDL of 40 kN/m on the whole length. Evaluate the reactions at the support and the support moments.	7M	CO3	L3
(b)	A fixed beam 6 m span supports two-point loads of 30 kN each at 2 m from each end. Solve the fixed moments also draw BMD.	7M	CO3	L3
(OR)				
6(a)	A continuous beam ABC covers two consecutive span AB and BC of lengths 4 m and 6 m, carrying uniformly distributed loads of 6kN/m and 10 kN/m respectively. If the ends A and C are simply supported, find the support moments at A, B and C.	7M	CO3	L3
(b)	Evaluate the moment of fixed-fixed beams at each support as shown in figure 3  Fig.3	7M	CO3	L3
(OR)				
7(a)	Using castigliano's theorem, obtain the deflection at the centre of a beam (SSB) carrying UDL of 20kN/m over the whole span. length of beam is 3 m take $EI=2.5 \text{ MN-m}^2$.	7M	CO4	L3
(b)	Evaluate the deflection of the free end of the cantilever beam of length L carrying a point load P at free end using strain energy principles.	7M	CO4	L3
(OR)				
8(a)	Calculate the strain energy in a cantilever bar 3m long and 40mm diameter, when it is subjected to a tensile load of 100kN at free end Take $E= 2 \times 10^5 \text{ N/mm}^2$.	7M	CO4	L3
(b)	A beam of span L is fixed at one end and simply supported at the other end. It carries a UDL of w per unit run over the whole span. Find the reaction at the simply supported end, by the principle of least work (using Castigliano's theorem).	7M	CO4	L3
(OR)				
9(a)	Derive the expression for crippling load by Euler's formula for a column having both ends of the column are pinned or hinged.	7M	CO5	L3
(b)	Calculate the safe compressive load on a hollow cast iron column one end rigidly fixed and the other hinged of 150 mm external diameter and internal diameter 100 mm and 10 m in length. Use Euler's formula with a factor of safety of 5, and $E= 95 \text{ kN/mm}^2$.	7M	CO5	L3
(OR)				
10(a)	A hollow cast iron column of 150 mm external diameter and 100mm internal diameter is 3.5 m long. If one end of column rigidly fixed and other end free find the critical load on the column. assume modulus of elasticity for column material is 120Gpa.	7M	CO5	L3
(b)	A 1.5 meter long column has a circular cross section of 50 mm diameter. One end of column is fixed and other end is free. Taking a factor of safety of 3, calculate the safe load using Rankine's formula take $\sigma_c = 560 \text{ N/mm}^2$ and $\alpha = 1/1600$.	7M	CO5	L3

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

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

**20CE11-STRUCTURAL ANALYSIS
(CE)**

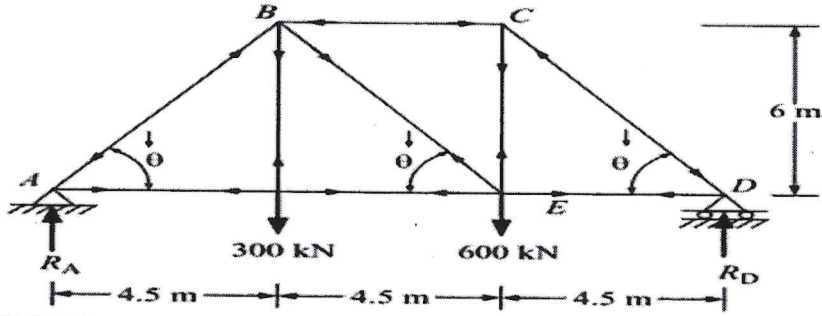
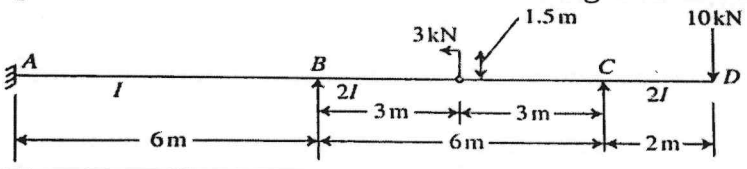
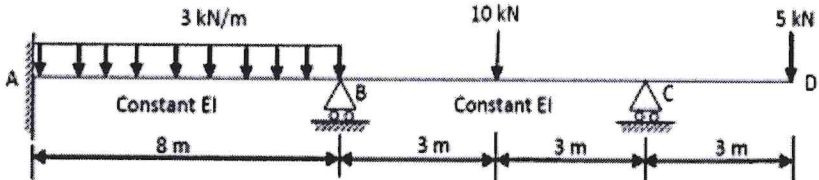
Time : 3 hours

Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	A three hinged arch parabolic arch ABC has a span of 20m and central rise of 6m. The arch has hinges at the ends and at the center. A train of two point loads of 15 kN and 16 kN, 5m apart, crosses this arch from left to right, with 20 kN load leading. Calculate maximum thrust induced at the support.	7M	CO1	L1
(b)	Draw and classify the different types of arches.	7M	CO1	L2
(OR)				
2(a)	The span and rise of a three hinged arch are 40m and 10m, respectively. The equation of the arch is $y = x - (x^2/40)$ with origin at left abutment and X-axis directed towards right and Y-axis upwards. A UDL of 15kN/m is applied on the left half of the arch. Find the reactions at abutments. Draw a moment diagram. Determine the locations of maximum moments.	7M	CO1	L3
(b)	Explain general cable theorem and derive the expression for horizontal reaction.	7M	CO1	L2
(OR)				
3(a)	A beam of length 5 m and of uniform rectangular section is supported at its ends and carries uniformly distributed load over the entire length. Calculate the depth of the Section if the maximum permissible bending stress is 8 N/mm ² and central deflection is not to exceed 10 mm.	7M	CO2	L2
(b)	Derive an expression for deflection and slope of a cantilever beam carrying a point load at the free end by moment area method.	7M	CO2	L1
(OR)				
4(a)	A beam 4 meters long, simply supported at its ends, carries a point load W at its centre. If the slope at the ends of the beam is not to exceed 1° find the deflection at the centre of the beam.	7M	CO2	L2
(b)	A simply supported beam of span 6 meters carries a central point load of 20 kN. Find the maximum slope and deflection by moment area method. Given EI = 4000 kN-m ² .	7M	CO2	L3
(OR)				
5(a)	Prove the expression for the strain energy due to beam bending is integral $M^2/2EI$.	7M	CO3	L2
(b)	Determine the vertical deflection at the free end of the bent shown. Assume uniform EI throughout using unit load method.	7M	CO3	L2
(OR)				

20CE11-STRUCTURAL ANALYSIS

6(a)	State the difference between strain energy method and unit load method in the determination of deflection of structures.	7M	CO3	L3
6(b)	Determine the horizontal displacement of roller support of the truss shown in figure. The cross-sectional areas of all top chord members 6000 mm^2 and the other members are 3000 mm^2, take $E=200 \text{ GPa}$. 	7M	CO3	L2
7(a)	Draw the shear force and bending moment diagram for a propped cantilever carrying a Uniformly Distributed load over the length 'L' and propped at the free end. Indicate the point of contraflexure and find the deflection.	7M	CO4	L2
7(b)	A fixed beam AB of length 6m carries two point loads of 30 kN each at a distance of 2m from either end. Determine the fixed end moments and draw SFD and BMD.	7M	CO4	L1
(OR)				
8(a)	A cantilever of length 4 m carries a UDL of 1 kN/m run over the whole span length. The cantilever is propped rigidly at the free end. Determine the reaction at the rigid prop and draw SFD and BMD.	7M	CO4	L2
8(b)	A fixed beam AB, 7.5 m long, is carrying a point load of 50kN at its centre and udl of 20kN/m throughout the span. Determine: (i) Fixed end moments at A and B and draw SFD and BMD.	7M	CO4	L2
9(a)	A continuous beam ABC of uniform section, with span AB and BC as 4 m each, is fixed at A and simply supported at B and C. The beam is carrying a uniformly distributed load of 6 kN/m run throughout its length. Find the support moments and the reactions. Also draw the bending moment and S.F. diagrams.	7M	CO5	L1
9(b)	A continuous beam with left end fixed with an overhang on the right is shown in the figure below. Determine the end moments by slope-deflection method. Also draw bending moment diagram. 	7M	CO5	L2
(OR)				
10(a)	What is the Clapeyron's theorem of three moments? Derive an expression for Clapeyron's theorem of three moments.	7M	CO5	L2
10(b)	Analyse the beam ABCD shown in figure by Slope-Deflection method and draw bending moment diagram. 	7M	CO5	L3

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

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

**20IT01-SOFTWARE ENGINEERING
(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)	What are the Characteristics of Software?	7M	CO1	L2
(b)	Demonstrate Spiral Model with neat diagram.	7M	CO1	L2
(OR)				
2(a)	Describe the Software Myths.	7M	CO1	L2
(b)	Discuss the phase involved in Waterfall Model.	7M	CO1	L2
3(a)	Demonstrate Software Requirements Specifications (SRS) in details.	7M	CO2	L2
(b)	Distinguish between Functional and Non-functional requirements.	7M	CO2	L2
(OR)				
4(a)	Demonstrate the importance of Requirements Analysis.	7M	CO2	L2
(b)	List out the different phases of Unified Process with neat diagram.	7M	CO2	L2
5(a)	Define object diagrams in UML and their role in modeling instances of classes at a specific point in time. Discuss the relationship between class diagrams and object diagrams in UML modeling.	7M	CO3	L1
(b)	Explain how different stakeholders, including developers, designers, and project managers, utilize UML diagrams throughout the software development lifecycle.	7M	CO3	L2
(OR)				
6(a)	Explain how UML defines things such as classes, objects, interfaces, and relationships between them.	7M	CO3	L2
(b)	Discuss common mechanisms provided by UML for modeling software systems, such as inheritance, polymorphism, and encapsulation.	7M	CO3	L2
7(a)	Discuss how Use-case Diagrams visualize the relationships between Actors and Use-cases and how they help stakeholders understand system functionality.	7M	CO4	L2
(b)	Discuss the elements of a State Chart Diagram including States, Transitions and Events.	7M	CO4	L2
(OR)				
8(a)	Define events and signals in the context of Behavioral Modeling and explain their significance in representing Asynchronous Communication between Objects.	7M	CO4	L1
(b)	Describe the purpose of Deployment Diagrams and how they visualize the physical deployment of software components on hardware nodes.	7M	CO4	L2
9(a)	Discuss Debugging and various strategies in debugging.	7M	CO5	L2
(b)	Explain software testing strategies.	7M	CO5	L2
(OR)				
10(a)	Explain software testing and its importance in SDLC.	7M	CO5	L2
(b)	Discuss various steps for top-down and bottom-up integration.	7M	CO5	L2

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

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

20AM01-INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

(CSE (AI&ML))

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 four main approaches of Artificial Intelligence.	7M	CO1	L2
(b)	Illustrate the Utility based agent with neat sketch.	7M	CO1	L2
(OR)				
2(a)	Describe the history of Artificial Intelligence.	7M	CO1	L2
(b)	Explain nature of environments in AI.	7M	CO1	L2
3(a)	Explain about the uniformed search strategies with an example.	7M	CO1	L2
(b)	Describe about the Searching with nondeterministic actions in AI with example.	7M	CO1	L2
(OR)				
4.	Explain about the different approaches in problem-solving agent with an example.	14M	CO3	L3
5(a)	Explain propositional logic connectivity's required for knowledge representation.	7M	CO3	L2
(b)	Summarize Knowledge based agent components and operations.	7M	CO3	L2
(OR)				
6(a)	Explain Mental Objects and Modal Logic.	7M	CO3	L2
(b)	Describe semantic networks for categories in knowledge representation.	7M	CO3	L2
7(a)	Explain concept learning and its importance in machine learning	7M	CO4	L2
(b)	Explain version spaces in the context of concept learning and how they facilitate hypothesis refinement.	7M	CO4	L2
(OR)				
8(a)	Define a well-posed learning problem in the context of machine learning and discuss its key components.	7M	CO4	L1
(b)	Describe the general-to-specific ordering approach in concept learning and its significance in hypothesis space exploration	7M	CO4	L2
9(a)	Suppose S is a collection containing 14 examples, with 9+,5-1. Out of these 14 examples, suppose 6 of the positive and 2 of the negative examples have Wind = Weak, and the remainder have Wind = Strong with 3 positive and 3 negative. Calculate the Information gain due to sorting the original 14 examples by the attribute Wind.	7M	CO5	L3
(b)	Explain decision tree representation with suitable notations.	7M	CO5	L2
(OR)				
10(a)	Illustrate hypothesis space search in decision tree learning.	7M	CO5	L2
(b)	Summarize issues in decision tree learning.	7M	CO5	L2

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

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

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

20EC07-ANALOG 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)	Discuss the Generation of AM wave using square law Modulator.	7M	CO2	L2
(b)	A modulating signal $m(t)=20\cos(2\pi\times 10^3t)$ is amplitude modulated with a carrier signal $c(t)=50\cos(2\pi\times 10^5t)$. Find the modulation index, the carrier power, and the power required for transmitting AM wave.	7M	CO3	L3
(OR)				
2(a)	Derive the time domain and frequency domain expression of multi tone AM wave and draw the waveforms.	7M	CO1	L3
(b)	Calculate Power and Bandwidth of DSBSC Wave whose carrier signal $c(t) = 20.\cos(2\pi.10^6t)$ and message signal $m(t) = 5.\cos(8\pi.10^3t)$.	7M	CO3	L3
3(a)	Discuss the generation of SSB-SC Signal using Frequency Discrimination method.	7M	CO2	L2
(b)	Calculate total power for SSB-SC for modulating index (i) 0.5 (ii) 1.	7M	CO3	L3
(OR)				
4(a)	Describe how a VSB modulated wave is generated. What are the key components and processes involved in VSB modulation?	7M	CO2	L2
(b)	Summarize the differences between the SSBSC -AM, vestigial sideband suppressed carrier amplitude modulated signal (VSB SC-AM), DSBSC and AM.	7M	CO1	L2
5(a)	Describe the process involved in the generation of narrow band frequency modulation (NBFM) with necessary block diagram.	7M	CO2	L2
(b)	An FM wave is given by $s(t)=20\cos(8\pi\times 10^6t + 9\sin(2\pi\times 10^3t))$. Calculate the frequency deviation, bandwidth, and power of FM wave.	7M	CO3	L3
(OR)				
6(a)	Explain the Simple slope detector method for FM demodulation.	7M	CO2	L2
(b)	How does the Ratio Detector method extract the modulating signal from the FM carrier wave?	7M	CO2	L2
7(a)	Briefly describe the main classifications of radio transmitters.	7M	CO1	L2
(b)	Discuss the FM transmitter using Reactance modulator.	7M	CO1	L2
(OR)				
8(a)	What is the significance of AGC circuit in Super heterodyne receiver? Differentiate between simple, delayed and amplify AGC.	7M	CO1	L2
(b)	In a broadcast AM receiver having no RF stage the loaded Q of the coupling circuit is 100.If the intermediate frequency is 455KHz, calculate image frequency and its rejection ratio at 1 MHz and 25MHz.	7M	CO3	L3
9(a)	Discuss the types of Sampling.	7M	CO1	L2
(b)	Analyze the input signal to noise ratio in SSBSC receiver.	7M	CO4	L4
(OR)				
10.	How does the figure of merit for a Double-Sideband Full Carrier (DSBFC) AM receiver serve as a comprehensive metric for evaluating its performance and efficiency in signal reception?	14M	CO4	L4

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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

B.Tech. (IV Semester) Supplementary Examinations

20EE10-ANALOG 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)	Explain how hybrid- π parameters are related to h-parameters.	7M	CO1	L2
(b)	Derive the expression for upper cutoff frequency of CE amplifier.	7M	CO1	L3
(OR)				
2(a)	Define and explain: Trans conductance Input impedance Feedback conductance Base spreading resistance.	7M	CO1	L1
(b)	Explain the role of hybrid- π capacitances (C_{π} and C_{μ}) in high-frequency response.	7M	CO1	L2
3(a)	Explain direct-coupled Class A power amplifier.	7M	CO1	L2
(b)	Explain the operation of complementary symmetry Class B power amplifier.	7M	CO1	L2
(OR)				
4(a)	Explain Class S power amplifier.	7M	CO1	L3
(b)	Compare Class A, B, AB, and C amplifiers.	7M	CO1	L2
5.	Explain the different types of basic amplifiers with neat diagrams.	14M	CO1	L2
(OR)				
6(a)	Discuss any two negative feedback topologies with neat diagram.	7M	CO1	L2
(b)	Derive the relationship between gain sensitivity and feedback.	7M	CO1	L2
7(a)	What are oscillators? Classify different types of oscillators with examples.	7M	CO2	L2
(b)	Explain the operation of RC phase shift oscillator using FET with circuit diagram.	7M	CO2	L3
(OR)				
8(a)	Explain the operation of Colpitts oscillator with circuit diagram and derive frequency of oscillation..	7M	CO2	L3
(b)	Explain the piezoelectric effect and its application in crystal oscillators.	7M	CO2	L2
9(a)	Describe the response of an RC circuit to a step input.	7M	CO4	L2
(b)	Explain the operation of an RC integrator circuit.	7M	CO4	L2
(OR)				
10(a)	Explain the working of a combination clipper that clips the input signal at two independent reference levels.	7M	CO3	L2
(b)	Explain the operation of a negative clamping circuit with a neat diagram.	7M	CO3	L2

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

20ME09-THEORY OF MACHINES

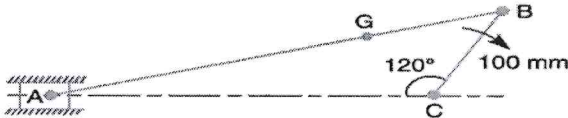
(ME)

Time : 3 hours

Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No.	Questions	Marks	CO	BL
1.	Illustrate all the inversions of double slider crank chain.	14M	CO1	L2
(OR)				
2(a)	Describe the working of Beam engine with the help of illustration.	7M	CO1	L2
(b)	Define Grashof's law. State how is it helpful in classifying the four link mechanisms into different types	7M	CO1	L2
3(a)	What is the difference between ideal mechanical advantage and actual mechanical advantage?	7M	CO2	L2
(b)	In a slider crank mechanism, the length of crank OB and connecting rod A B are 125 mm and 500 mm respectively. The centre of gravity G of the connecting rod is 275 mm from the slider A. The crank speed is 600 r.p.m. clockwise. When the crank has turned 45° from the inner dead centre position, determine: (i) velocity of the slider A, (ii) velocity of the point C, and (iii) angular velocity of the connecting rod AB,	7M	CO2	L3
(OR)				
4.	An engine mechanism is shown in Fig. The crank CB = 100 mm and the connecting rod BA = 300 mm with centre of gravity G, WO mm from B. In the position shown, the crankshaft has a speed of 75 rad/s and an angular acceleration of 1200 rad/s ² . Find: (i) velocity of G and angular velocity of AB, and (ii) acceleration of G and angular acceleration of AB. 	14M	CO2	L4
5.	The torque at the crankshaft of an engine is given by the equation, $T = (5000 + 1500 \sin 3\theta)$ N.m Where θ is the crank angle. The mean engine speed is 300 rpm and the moment of inertia of the flywheel is 300 kg.m ² . Determine the power of the engine and the maximum fluctuation of speed of the flywheel when the resisting torque is constant. Also find the fluctuation of speed if the resisting torque is $(5000 + 600 \sin \theta)$.	14M	CO3	L3
(OR)				
6(a)	Derive the expression for minimum number of teeth required on pinion in order to avoid interference.	7M	CO3	L2

20ME09-THEORY OF MACHINES

(b)	A spur gear has a module of 2 mm and its pitch line velocity is 0.6283m/s. If the number of teeth of this spur gear is 30, find the speed of the gear. Also determine its circular pitch.	7M	CO3	L3
7.	A Hartnell governor having a central sleeve spring and two right-angled bell crank levers moves between 290 r.p.tn. and 310 rp.tn. for a sleeve lift of 15 mm. The sleeve arms and the ball arms are 80 mm and 120 mm respectively. The levers are pivoted at 120 mm from the governor axis and mass of each ball is 2.5 kg. The ball arms are parallel to the governor axis at the lowest equilibrium speed. Determine : (i) loads on the spring at the lowest and the highest equilibrium speeds, and (ii) stiffness of the spring.	14M	CO4	L3
(OR)				
8(a)	Explain about Proell governor with neat sketch.	7M	CO4	L2
(b)	A governor of the Proell type has each arm 250 mm long. The pivots of the upper and lower arms are 25 mm from the axis. The central load acting on the sleeve has a mass of 25 kg and the each rotating ball has a mass of 3.2 kg. When the governor sleeve is in mid-position, the extension link of the lower arm is vertical and the radius of the path of rotation of the masses is 175 mm. The vertical height of the governor is 200 mm. If the governor speed is 60 r.p.m. when in mid-position, find : (i) length of the extension link; and (ii) tension in the upper arm.	7M	CO4	L3
9(a)	Write about the term overdamping of vibrating system. Explain vibration isolation and transmissibility.	7M	CO5	L2
(b)	Four masses m_1, m_2, m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45° , 75° and 135° . Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.	7M	CO5	L3
(OR)				
10(a)	Mention the effects of vibrations in simple vibrating system. Elucidate the natural frequency of free longitudinal vibration by equilibrium method.	7M	CO5	L2
(b)	A shaft carries four masses in parallel planes A, B, C and D in this order along its length. The masses at B and C are 18 kg and 12.5 kg respectively, and each has an eccentricity of 60 mm. The masses at A and D have an eccentricity of 80 mm. The angle between the masses at B and C is 100° and that between the masses at B and A is 190° , both being measured in the same direction. The axial distance between the planes A and B is 100 mm and that between B and C is 200 mm. If the shaft is in complete dynamic balance, determine : (i) The magnitude of the masses at A and D; (ii) The distance between planes A and D; (iii) The angular position of the mass at D.	7M	CO5	L3

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

20HS01-UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

(Common to All)

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 importance of value education to build a better society in a world of social and ethical challenges.	7M	CO1	L2
(b)	Define and explain the concepts of Natural Acceptance and Experiential Validation in the context of self-exploration and in identifying our values.	7M	CO1	L2
(OR)				
2(a)	Explain what continuous happiness and prosperity. Discuss the challenges a person might face in achieving continuous happiness.	7M	CO2	L2
(b)	Contrast the role of “Right Understanding,” “Relationships,” and “Physical Facilities” in achieving happiness and prosperity. Brief why these three are interdependent.	7M	CO2	L3
3(a)	Differentiate the needs of the Self and the needs of the Body. Explain how fulfilling the needs of both contribute to overall well-being and happiness.	7M	CO2	L3
(b)	The concept of “the body as an instrument of I” suggests a distinction between the Self and the physical body. Describe the roles of “I” as the doer, seer, and enjoyer in this context.	7M	CO2	L3
(OR)				
4(a)	Explain the meaning of Sanyam and discuss its role in maintaining good health (Swasthya).	7M	CO1	L2
(b)	Summarize physical needs and wants. Distinguish two factors that can influence a person’s perception of their physical needs.	7M	CO2	L2
5(a)	What makes families and societies harmonious? How can individuals build harmony in their interactions?	7M	CO3	L2
(b)	How does justice go beyond fairness in relationships, considering values like trust, respect, affection, care, guidance, reverence, glory, gratitude, and love?	7M	CO3	L2
(OR)				
6(a)	Discuss why trust and respect are considered foundational in a healthy relationship (romantic, platonic, professional). Discuss how the absence of either trust or respect can negatively impact a relationship.	7M	CO3	L2
(b)	Briefly explain how the goals like resolution, prosperity, fearlessness, and co-existence are interconnected.	7M	CO3	L2
7(a)	It suggests that existence is about coexistence. How do living things work together in nature (coexist) to create harmony? Give two examples.	7M	CO4	L3
(b)	The nature has four connected parts (physical, biological, human, pranic). How do these parts work together to help each other? Give an example.	7M	CO4	L2
(OR)				
8(a)	It is described that existence as the “coexistence of mutually interacting units in all-pervasive space.” Discuss two examples of how units within nature interact with each other.	7M	CO4	L2
(b)	Summarize what is meant by a holistic perception of harmony. Examine how this perception views the relationship between individuals, communities, and the environment.	7M	CO4	L2
9(a)	Examine how the understanding of harmony can influence the ethical decision-making process in a professional setting. Provide two examples of how prioritizing harmony might guide ethical choices in different professions (e.g., healthcare, engineering, business).	7M	CO5	L2
(b)	Explain the three key components that contribute to definitiveness: values, policies, and character. Discuss how these three elements work together to guide ethical behavior.	7M	CO5	L2
(OR)				
10(a)	How do Humanistic Education, Constitution, and Order all focus on human potential to create a better society? Explain each element’s role.	7M	CO5	L3
(b)	Professional ethics go beyond codes. What does “competence” mean here, and how can professionals develop it?	7M	CO5	L2