AR20

CODE: 20ITE321 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October,2023

Fundamentals of Fuzzy Logic

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.		The task of recognize English alphabetical characters $\{P,R,F,B,A,Z\}$ in an image processing system. Define two fuzzy sets P and R to represent the identification of characters P and R are $P = \{(P,1),(R,0.9),(F,0.6),(A,0.5),(Z,0)\}$ $R = \{(P,0.9),(R,1),(F,0.4),(A,0.6),(Z,0)\}$. Find 1.$(P-R)$ 2. $P \cup R$ 3. $P \cup R^c$ 4. *Verify Demorgan laws* $(P \cup R)^c = P^c \cap R^c$ *and* $(P \cap R)^c = P^c \cup R^c$ 5.*Verify* $(P^c)^c = P$.	10	CO1	Applying
		(OR)			
2.		Consider the fuzzy sets A, B and C defined on [1,5] by the membership grade function $\mu_A(x) = \frac{x}{x+2}$, $\mu_B(x) = \frac{1}{1+10(x-2)^2}$, $\mu_c(x) = 2^{-x}$. Find the membership grade functions of (i) $A^c, (ii)$ Show that A ∪ (B ∩ C) = (A ∪ B) ∩ (A ∪C) $, (iii)\ C^c\ (iv) A \cup (B \cup C)\ (v)\ (A \cup B) \cup C$	10	CO1	Applying
		UNIT-II			
3.		For fuzzy sets, $A = high\ strenght\ steel = \left\{\frac{1}{s_1} + \frac{0.5}{s_2} + \frac{0.2}{s_3}\right\}$, $B = near\ optimum\ weight = \left\{\frac{1}{w_1} + \frac{0.5}{w_2} + \frac{0.3}{w_3}\right\}$ and $C = moderately\ good\ steel\ strenght = \left\{\frac{0.1}{s_1} + \frac{0.6}{s_2} + \frac{1}{s_3}\right\}$, find $(i) S = C \times B\ \ (ii) R = A \times B\ \ \ (iii)\ S \circ R$	10	CO2	Applying
		(OR)			
4.	a)	Let R be a relation defined on $X \times Y$ and S be defined on $Y \times Z$ as $X = \{x_1,x_2\}, Y = \{y_1,y_2\}\ and\ Z = \{z_1,z_2,z_3\}$, $R = \begin{matrix} x_1 \\ x_2 \end{matrix}\begin{bmatrix} y_1 & y_2 \\ 0.7 & 0.5 \\ 0.8 & 0.4 \end{bmatrix}$ *and* $S = \begin{matrix} y_1 \\ y_2 \end{matrix}\begin{bmatrix} z_1 & z_2 & z_3 \\ 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{bmatrix}$. Find the relation T = $R \circ S$ which relates the elements of universe X to Z by *using max − min composition.*	5	CO2	Applying
	b)	Show that $R = \begin{matrix} x_1 \\ x_2 \end{matrix}\begin{bmatrix} x_1 & x_2 \\ 1.0 & 0.5 \\ 0.8 & 1.0 \end{bmatrix}$ is a fuzzy tolerance relation	5	CO2	Understanding

UNIT-III

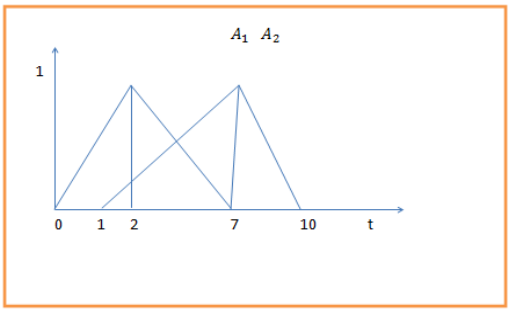
5.	a)	Let $A = \{\frac{0.1}{x_1}, \frac{0.9}{x_2}, \frac{0}{x_3}\} B = \{\frac{0}{y_1}, \frac{1}{y_2}, \frac{0}{y_3}\}$, if $B' = \{\frac{0.2}{y_1}, \frac{1}{y_2}, \frac{0.3}{y_3}\}$, find A' using generalized Modus Tollens.	5	CO3	Applying
	b)	Given the fuzzy sets A & B defined on X &Y, by $A = 1 - 0.2x, x \in [0,1,2,3,4,5]; B = 0.25y, y \in [0,1,2,3,4]$. Find the truth value for the implication $A \rightarrow B$.	5	CO3	Applying
		(OR)			
6.	a)	Let X= $\{x_1, x_2, x_3\}$, $Y = \{y_1, y_2\}$ be the universal sets, $A = \{\frac{0.6}{x_1}, \frac{0.9}{x_2}, \frac{1}{x_3}\}$, $B = \{\frac{0.6}{y_1}, \frac{1}{y_2}\}$, $B' = \{\frac{0.5}{y_1}, \frac{0.9}{y_2}\}$ be the fuzzy sets, then estimate A' using **generalized Modus Tollens rule.**	5	CO3	Analyzing
	b)	Give a brief explanation on : (i)approximate reasoning,(ii) Natural language, (iii) linguistic hedges	5	CO3	Understanding

UNIT-IV

7.		Construct a fuzzy set using "Lagrange's Interpolation" method for the following data: {(0,0), (0.5,0.2), (0.8,0.9), (1,1), (1.2,0.9), (1.5,0.2), (2,0)}.	10	CO4	Applying
		(OR)			
8.	a)	Explain the "Direct method with one expert" , "Direct method with multiple experts" in construction of a fuzzy set.	5	CO4	Understanding
	b)	For the sample data given by (x_i, a_i)= {(0,0), (0.5, 0.2), (0.8,0.9), (1,1), (1.2, 0.9),(1.5, 0.2), (2, 2)}, consider α=1, β=0.164, ϑ=1.074, find the error of f(x) = $\gamma e^{\frac{-(x_i-\alpha)^2}{\beta}}$ .Also find the fuzzy set A(x) for the given data.	5	CO4	Applying

UNIT-V

9.		For the union of two fuzzy sets A_1 & A_2 as shown below, Calculate the defuzzified avalue of Z^* using (i) Centroid Method (ii) Centre of Sums method (iii)Mean of Maxima method.	10	CO5	Applying



(OR)

10.		Define a fuzzy controller to regulate the temperature of a Domestic shower assuming that (1) temperature is adjustable by single tap, (ii) the flow of water is constant, (iii) central variable is the ratio of hot to cold water. Find the temperature of the water if the tap position is at 170^0.	10	CO5	Applying

UNIT-VI

11.	a)	Differentiate between Mamdani and Sugeno Fuzzy Inference System.	5	CO6	Understanding
	b)	Consider two inputs I1 and I2, with linguistic states :I1 : L(low), M(Medium), H(High), I2 : NR(Near), FR (Far), VF(Very Far) The output of any i-th rule can be expressed by the following. yi = f (I1; I2) = ai j I1 + bik I2 ; where, j,k = 1,2,3.**Suppose** : ai1 = 1, ai2 = 2, ai3 = 3 if I1 = L;M and H, respectively. bi1 = 1, bi2 = 2, bi3 = 3 if I2 = NR; FR; and VF, respectively. calculate the output using Takagi Sugeno system for I1 = 6.0 and I2 = 2.2	5	CO6	Applying

(OR)

12.		Design a fuzzy lighting controller system, in which the control system dim the bulb light automatically according to the environmental Light. Assume that the inputs to the system are the environmental light ***x1*** and the changing rate of the environmental light ***x2***. While the output variable which represents the control value to the dimmer is ***DM***. Consider the following assumption: Assume that *x1* can be *Dark (D), Medium (M),* and *Light (L)* and its range between 120 and 220, with three membership functions: L(130,150), M(130, 150 190,210), and D(190, 210). *x2* ranges between -10 and +10 and is divided into *Negative-Small(NS)*, *Zero (ZE)*, and *Positive-Small (PS)*, with three membership functions: NS(-20, -10, 0), ZE(-10, 0, 10), and PS(0,10,20). The output *DM* ranges between 0 and 10 and is divided into *Very small(VS),Small (S), Big(B),* and *Very-big (VB*), with four membership functions: VS(2,4), S(2,4,6), B(4,6,8), and VB(6,8) for *VS, S, B,* and *VB* respectively. Evaluate the output using Mamdani model for $x1 = 125$ and $x2 = -6$, having the following fuzzy rule base:	10	CO6	Applying

X1 / X2	D	M	L
PS	B	S	VS
ZE	B	B	S
NS	VB	B	B

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular/Supplementary Examinations, October-2023
Renewable Energy Sources

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a	Outline the comparison between Renewable and Non-Renewable energy sources?	5	1	2
	b	Explain the role of renewable energy sources?	5	1	2
		(OR)			
2.		Explain about different solar radiation measuring devices with the help of neat sketch?	10	1	2
		UNIT-II			
3.		Explain about different types of flat plate and concentrating type solar radiation collectors.	5	2	2
		(OR)			
4.	a	List out the parameters of energy?	5	2	2
	b	List the advantages and disadvantages of Solar PV systems?	5	2	2
		UNIT-III			
5.	a	Distinguish between horizontal axis and vertical axis wind turbines	5	3	2
	b	List the advantages and disadvantages of wind energy.	5	3	2
		(OR)			
6.		Explain the working of Wind Energy Conversion System (WECS) with main components.	10	3	3
		UNIT-IV			
7.	a	List the sources of Biomass energy?	5	4	2
	b	List various processes of Energy Conversion from Biomass. Explain any one process	5	4	2
		(OR)			
8.	a	Discuss different types of Bio- conversion processes.	5	4	2
	b	List the advantages and disadvantages of biomass energy.	5	4	2
		UNIT-V			
9.	a	List the advantages and disadvantages of geothermal energy	5	5	2
	b	Explain about single basin single effect scheme of tidal energy generation.	5	5	2
		(OR)			
10.	a	Explain the closed cycle OTEC plant with the help of neat sketch	5	5	2
	b	List the advantages and disadvantages of tidal energy.	5	5	2
		UNIT-VI			
11.	a	Explain (i) Seebeck (ii) Peltier and (iii) Joule Thomson effects.	5	6	2
	b	List the advantages and disadvantages of MHD energy.	5	6	2
		(OR)			
12.		Explain the closed cycle MHD plant with the help of neat sketch	10	6	2

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

Fundamentals of ROBOTICS

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Define Robot. Define and explain the automation and its types.	7M	CO1	I
	b)	Explain the types of grippers used in Robots	3M	CO1	II
		(OR)			
2.	a)	Differentiate the difference between Joint and Link in a Robot.	2M	CO1	IV
	b)	Explain four different types of mechanical Joints in a Robot with a neat sketch.	8M	CO1	II
		UNIT-II			
3.	a)	Explain the working principle of a stepper motor with a neat sketch	7M	CO2	II
	b)	Explain the types of robot control systems	3M	CO2	II
		(OR)			
4.	a)	Differentiate and compare between hydraulic, pneumatic and electrical actuators with a neat sketch.	7M	CO2	IV
	b)	Explain the working principle of DC, AC and servo motor	3M	CO2	II
		UNIT-III			
5.	a)	Define the terms related to sensors: a) Range, b) Response, c) Accuracy, d) Sensitivity, and e) Repeatability	5M	CO3	I
	b)	Explain the working principle of angular potentiometer with a neat sketch	5M	CO3	II
		(OR)			
6.	a)	Briefly explain the Inductive sensors used in robot	5M	CO3	I
	b)	Classify the types of sensors along with their examples	5M	CO3	II
		UNIT-IV			
7.	a)	Find the rotation of a vector v = 5i + 3j + 8k by the angle 90° about x-axis	3M	CO4	III
	b)	Define and explain about homogenous transformation	7M	CO4	I
		(OR)			
8.		Determine the composite rotation matrix for the following i. Rotation of angle α about x-axis ii. Rotation of angle β about y-axis iii. Rotation of angle γ about z-axis	10M	CO4	V
		UNIT-V			
9.	a)	Briefly explain the six steps of robot programming development process	6M	CO5	II
	b)	Differentiate between point recording vs. Trajectory recording in online programming methods	4M	CO5	IV
		(OR)			
10.		Explain the levels of robot programming with examples	10M	CO5	II
		UNIT-VI			
11.	a)	Explain the advantages and disadvantages of robots	5M	CO6	II
	b)	Explain the material handling applications of the robots	5M	CO6	II
		(OR)			
12.	a)	Classify the applications of industrial robots	6M	CO6	II
	b)	Explain the applications of robots in welding industry	4M	CO6	II

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October,2023

Principles of Communications

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Define modulation and explain the need for modulation in communication system.	6	CO1	Understanding
	b)	Classify modulation schemes	4	CO1	Analyzing
		(OR)			
2.	a)	Explain the time domain representation of amplitude modulation.	6	CO1	Understanding
	b)	A modulating signal $m(t)=\cos(2\pi\times10^3t)$ is amplitude modulated with a carrier signal $c(t)=5\cos(2\pi\times10^5t)$. Obtain the unmodulated carrier power and the power required for transmitting AM wave.	4	CO1	Applying
		UNIT-II			
3.	a)	Compare FM and AM.	6	CO2	Analyzing
	b)	Compute the bandwidth of FM wave if the highest frequency content of message signal is 3kHz and maximum frequency deviation is 75kHz.	4	CO2	Applying
		(OR)			
4.	a)	Obtain the expression for modulation index in FM using single tone modulation.	6	CO2	Applying
	b)	Classify FM wave based on modulation index.	4	CO2	Understanding
		UNIT-III			
5.	a)	What is sampling? What is Nyquist rate of sampling? Explain aliasing affect	6	CO3	Understanding
	b)	Determine the Nyquist sampling rate for a given message signal $m(t)=5\cos(2\pi\times10^3t)$.	4	CO3	Applying
		(OR)			
6.	a)	Explain generation and demodulation of PAM.	6	CO3	Understanding
	b)	Mention advantages and applications of PAM	4	CO3	Remembering
		UNIT-IV			
7.	a)	Describe the elements of a digital communication system	6	CO4	Understanding
	b)	List the advantages of a digital communication system	4	CO4	Remembering
		(OR)			
8.		Describe delta modulation with necessary block diagram	10	CO4	Understanding
		UNIT-V			
9.		Explain modulation and demodulation process of frequency shift keying	10	CO5	Understanding
		(OR)			
10.		Describe Differential Phase Shift Keying modulation and demodulation with relevant diagrams	10	CO5	Understanding
		UNIT-VI			
11.	a)	Explain various types of internal and external noise	6	CO6	Understanding
	b)	An operational amplifier with a frequency range of (18-20) MHz has input resistance 10 kΩ. Calculate noise voltage at the input if the amplifier operates at ambient temperature of 27^0C.	4	CO6	Applying
		(OR)			
12.	a)	Describe about noise figure in a communication system	6	CO6	Understanding
	b)	Determine the signal to noise power ratio for an amplifier with an output signal voltage of 4V, an output noise voltage of 0.005V, and an input and output resistance of 50Ω.	4	CO6	Applying

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

JAVA PROGRAMMING

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	List out the selection control statements available in Java. Explain with example	5M	CO1	K1
	b)	List out the looping statements available in Java. Explain with example	5M	CO1	K1
		(OR)			
2.	a)	What is an operator? Explain different types of operators in java language	5M	CO1	K2
	b)	List and explain Java Features, in detail.	5M	CO1	K2
		UNIT-II			
3.	a)	Explain the usage of this, super keyword in Java.	5M	CO2	K1
	b)	Diff Method Overloading Vs Method Overriding	5M	CO2	K1
		(OR)			
4.	a)	Explain method overloading concept with one example	5M	CO2	K2
	b)	What is a constructor? Explain the concept with suitable example	5M	CO2	K2
		UNIT-III			
5.	a)	Define Interface? Explain the concept with suitable example.	5M	CO3	K1
	b)	Explain the concept of method overriding with one example	5M	CO3	K2
		(OR)			
6.	a)	What is an inheritance? Explain different types of inheritances.	5M	CO3	K1
	b)	Write a program to implement Multilevel Inheritance.	5M	CO3	K2
		UNIT-IV			
7.	a)	What is a package? Explain with one example	5M	CO4	K1
	b)	What is an exception? Explain exception hierarchy.	5M	CO4	K1
		(OR)			
8.	a)	Explain about (i) try (ii)Catch blocks.	5M	CO4	K2
	b)	Write a program to implement the concept of Exception Handling Mechanism.	5M	CO4	K3
		UNIT-V			
9.	a)	What is a thread? Explain thread life cycle with one example	5M	CO5	K1
	b)	Write a java program for creating a thread.	5M	CO5	K3
		(OR)			
10.	a)	Explain Thread Priorities with one example	5M	CO5	K2
	b)	Write a java program for creating the a thread using Runnable Interface?	5M	CO5	K2
		UNIT-VI			
11.	a)	With a neat diagram, explain the life cycle of Applet.	5M	CO6	K1
	b)	What is an applet? Explain with one example.	5M	CO6	K1
		(OR)			
12.	a)	Write a java program to implement applet parameters	5M	CO6	K3
	b)	Explain the difference between an Applet and a Java Application	5M	CO6	K2

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

INTRODUCTION TO DBMS

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.		Discuss data models in detail.	10M	CO1	Understand
		(OR)			
2.	a)	Explain about ER model with example.	5M	CO1	Understand
	b)	List Database System Applications.	5M	CO1	Remember
		UNIT-II			
3.	a)	Describe integrity constraints over relations.	5M	CO2	Remember
	b)	Discuss different types of attributes in RDBMS.	5M	CO2	Understand
		(OR)			
4.	a)	Explain Conceptual Design with the ER Model.	6M	CO2	Understand
	b)	Define entity. Give different entity types.	4M	CO2	Remember
		UNIT-III			
5.	a)	Explain Logical connectives in RDBMS with example.	5M	CO3	Understand
	b)	Discuss about views.	5M	CO3	Understand
		(OR)			
6.	a)	Explain data types in SQL.	4M	CO3	Understand
	b)	Discuss aggregate operators with query examples	6M	CO3	Understand
		UNIT-IV			
7.	a)	Explain about nested queries in SQL. Give examples.	5M	CO4	Understand
	b)	Write a PL/SQL code for finding factorial of a given integer.	5M	CO4	Create
		(OR)			
8.		Discuss about JOIN operation in detail with examples.	10M	CO4	Understand
		UNIT-V			
9.	a)	Discuss problems Caused by Redundancy.	5M	CO5	Understand
	b)	Explain third normal form. Give example.	5M	CO5	Understand
		(OR)			
10.	a)	Define functional dependency. Write the inference rules of FD.	6M	CO5	Remember
	b)	Explain 2NF with example.	4M	CO5	Understand
		UNIT-VI			
11.	a)	Discuss transaction states.	5M	CO6	Understand
	b)	Describe the problems caused by concurrent execution of transaction.	5M	CO6	Remember
		(OR)			
12.		Explain in detail about file indexing	10M	CO6	Understand

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

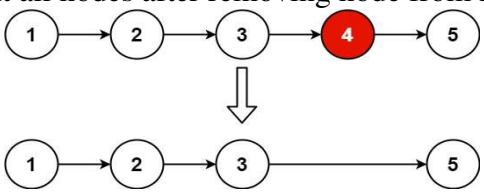
III B.Tech I Semester Regular/Supplementary Examinations, October-2023

Advanced Coding – II

Common to CSE/CSM/IT

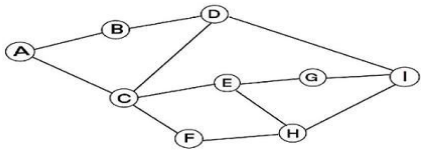
Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain Insertion at the random position and at the end in double linked list with pseudo codes.	5	CO1	K1
	b)	Given the head of a linked list, remove the n^{th} node from the end of the list and print all nodes after removing node from head  **Input:** head = [1,2,3,4,5], n = 2 **Output:** [1,2,3,5]	5	CO1	K3
		(OR)			
2.	a)	Explain Stack, its applications and implement all functionalities of stack.	5	CO1	K1
	b)	Given a string S containing just the characters '(', ')', '{', '}', '[' and ']', determine if the input string is properly Parenthesized. **Input:** s = "()[]{}" **Output**: true	5	CO1	K3
		UNIT-II			
3.	a)	Explain in detail about insertion sort technique and analyse the time and space complexity of insertion sort.	5	CO2	K4
	b)	You are given an integer array **nums** containing distinct numbers, and you can perform the following operations until the array is empty: • If the first element has the smallest value, remove it • Otherwise, put the first element at the end of the array. **Input**: **nums** = [3,4,-1] **Output:** 5 **Explanation:** Operations 1) [4 -1 3] 2) [-1 3 4] 3) [3 4] 4) [4] 5) []	5	CO2	K3
		(OR)			
4.	a)	Explain about Binary search algorithm and discus it's time and space complexities.	5	CO2	K1
	b)	You are given an array of integers **citations** where citations[i] is the number of citations a researcher received for their i^{th} paper, return the researcher's h-index.The h-index is defined as the maximum value of **h** such that the given researcher has published at least **h** papers that have each been cited at least **h** times. **Input**: **citations** =[3,0,6,1,5] **Output**: 3 **Explanation:** [3,0,6,1,5] means the researcher has 5 papers in total and each of them had received 3, 0, 6, 1, 5 citations respectively. Since the researcher has 3 papers with at least 3 citations each and the remaining two with no more than 3 citations each, their h-index is 3.	5	CO2	K3

UNIT-III

5.	a)	What is Binary Search Tree? Explain and implement to search an element in BST?	5	CO3	K1
	b)	Construct BFS for given below graph. Consider vertex E as the starting vertex.	5	CO3	K2



(OR)

6.	a)	Explain the graph representations i) Adjacency matrix and ii) Adjacency list	5	CO3	K1
	b)	Write a code to find the height of the given binary tree In given input **N** represents Null.	5	CO3	K2

Example 1:

Input: 1 2 3

```
  1
 / \
2   3
```

Output: 2

Example 2:

Input: 2 N 1 3 N

```
  2
   \
    1
   /
  3
```

Output:3

UNIT-IV

7.	a)	Explain about the Dijkstra's Algorithm with pseudo code.	5	CO4	K1
	b)	You are given an integer array **nums**. You are initially positioned at the array's first index, and each element in the array represents your maximum jump length at that position. Print true if you can reach the last index, or false otherwise. **Input:** nums = [2,3,1,1,4] **Output:** true **Explanation:** Jump 1 step from index 0 to 1, then 3 steps to the last index.	5	CO4	K2

(OR)

8.	a)	Explain how a Fractional knapsack algorithm works with suitable example and pseudo code.	5	CO4	K1
	b)	A company is planning to interview 2n people. Given the array of costs where costs[i]=[$aCost_i$, $bCost_i$], the cost of flying the i^{th} person to city a is $aCost_i$, and the cost of flying the i^{th} person to city b is $bCost_i$. Print the minimum cost to fly every person to a city such that exactly n people arrive in each city **Input:** costs = [[10,20],[30,200],[400,50],[30,20]] **Output:** 110 **Explanation:** The first person goes to city A for a cost of 10. The second person goes to city A for a cost of 30. The third person goes to city B for a cost of 50. The fourth person goes to city B for a cost of 20. The total minimum cost is 10 + 30 + 50 + 20 = 110 to have half the people interviewing in each city.	5	CO4	K3

UNIT-V

9.	a)	Explain Rabin-Karp algorithm with pseudo code and suitable examples.	5	CO5	K1
	b)	Given string str of **N** characters containing both uppercase and lowercase English alphabets, the task is to find the count of substrings of size **K** containing exactly **X** vowels. Implement it with the code? **Input:** str = "AitamStudent", K = 4, X = 2 **Output**: 3 **Explanation**: "itam","tude","uden"	5	CO5	K2

(OR)

10. a) You are given a string that consists of words separated by spaces. Each word consists of lowercase and uppercase letters only. We would like to convert the sentence to "Goat Latin" (a made-up language similar to Pig Latin.) The rules of Goat Latin are as follows:
    1. If a word begins with a vowel ('a', 'e', 'i', 'o', or 'u'), append "ma" to the end of the word.
       For example, the word "apple" becomes "applema".
    2. If a word begins with a consonant (i.e., not a vowel), remove the first letter and append it to the end, then add "ma".
       For example, the word "goat" becomes "oatgma".
    3. Add one letter 'a' to the end of each word per its word index in the sentence, starting with 1.
       For example, the first word gets "a" added to the end, the second word gets "aa" added to the end, and so on.

    Print the final sentence representing the conversion from sentence to Goat Latin. Implement it with code?
    Input: sentence = "The quick brown fox jumped over the lazy dog"
    Output: "heTmaa uickqmaaa rownbmaaaa oxfmaaaaa umpedjmaaaaaa overmaaaaaaa hetmaaaaaaaa azylmaaaaaaaaa ogdmaaaaaaaaaa"

    5 CO5 K3

    b) Given two strings **S** and **W** of sizes **N** and **M** respectively, the task is to remove the last occurrence of **W** from **S**. If there is no occurrence of **W** in **S**, print **S** as it is. Implement it with code.
    Input: S="Hello World", W="Hell" **Output:** o World

    5 CO5 K2

UNIT-VI

11. a) Illustrate rod cutting problem with Suitable example and write pseudo code?

    5 CO6 K1

    b) Given **n** dice each with m faces, numbered from 1 to **m**, find the number of ways to get sum **X**. **X** is the summation of values on each face when all the dice are thrown.
    Input: n = 2, **m** = 6, **X** = 7
    Output: 6
    Explanation: You throw two dice, each with 6 faces.
    There are 6 ways to get a sum of 7: 1+6, 2+5, 3+4, 4+3, 5+2, 6+1.

    5 CO6 K2

(OR)

12. a) You are given a list of different denominations and an amount. Print the fewest number of coins that you need to make up that amount. If that amount of money cannot be made up by any combination of the denominations print -1.
    Assume infinite supply of each denomination.
    Input: coins = [1,2,5], amount = 11 **Output:** 3
    Explanation: 11 = 5 + 5 + 1

    5 CO6 K2

    b) Given an integer **n**, print the least number of perfect square numbers that sum to **n**.
    Input: n = 13
    Output: 2
    Explanation: 13 = 4 + 9.

    5 CO6 K3

AR20

CODE: 20IET329 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October-2023

COMPETITIVE PROGRAMMING-II

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain the concept of extended uclidian algorithm.	4	CO1	Understand
	b)	Explain naive and better approach of Prime number in modular arithmetic and write a cpp program for prime number.	6	CO1	Apply
		(OR)			
2.	a)	Define modular arithmetic and explain	5	CO1	Understand
	b)	Write a cpp program for sieve of erathostenes	5	CO1	Apply
		UNIT-II			
3.	a)	What is a double Linked list? Explain its applications and write any three operations of double Linked List.	6	CO2	Understand
	b)	Write a CPP program for Single Linked List any three operations.	4	CO2	Apply
		(OR)			
4.	a)	Differentiate single linked list, double linked list and circular linked list.	5	CO2	Knowledge
	b)	What is a circular Linked list? Explain its applications and write any three operations of circular Linked List.	5	CO2	Understand
		UNIT-III			
5.	a)	Define Sorting. Explain bubble sort with example program	5	CO3	Understand
	b)	Explain quick sort with example	5	CO3	Apply
		(OR)			
6.	a)	What are the different sorting techniques? Explain insertion sort with code	5	CO3	Understand
	b)	Write a CPP program to get descending order values using selection sort?	5	CO3	Apply
		UNIT-IV			
7.	a)	Define stack. Explain various operations of Stack	5	CO4	Understand
	b)	Write a code for implementation of Queue using Linked List	5	CO4	Apply
		(OR)			
8.	a)	Define Queue. Explain various operations of Queue.	5	CO4	Understand
	b)	Write a code for implementation of Stack using Array.	5	CO4	Apply
		UNIT-V			
9.	a)	Define Tree. Explain various types of tree with examples	5	CO5	Understand
	b)	Explain the concept of DFS graph traversal with example	5	CO5	Apply
		(OR)			
10.	a)	Define Binary Tree and explain the insertion operation of binary search tree (BST)	5	CO5	Understand
	b)	Explain the concept of BFS graph traversal with example	5	CO5	Apply
		UNIT-VI			
11.	a)	Explain the concept of bottom up dynamic programming	5	CO6	Understand
	b)	Write a code for 0/1 Knapsack problem	5	CO6	Apply
		(OR)			
12.	a)	Write a code for egg dropping problem	5	CO6	Understand
	b)	Explain the concept of top down dynamic programming	5	CO6	Apply

AR16

CODE: 16CE3011 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October,2023

GEOTECHNICAL ENGINEERING-I

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) There are two borrow areas A and B which have soils with void ratios of 0.80 and 0.70, respectively. The inplace water content is 20%, and 15%, respectively. The fill at the end of construction will have a total volume of 10,000 m^3, bulk density of 2Mg/m^3 and a placement water content of 22%. Determine the volume of the soil required to be excavated for both areas. G = 2.65. If the cost of excavation of soil and transportation is Rs. 200/- per 100 m^3 for area A and Rs. 220/- per 100m^3 for area B, which of the borrow area is more economical? 10M

   b) Define soil structure and list different types of soil structures. 4M

(OR)

2. a) Discuss the characteristics and the construction of Kaolinite, Illite and Montmarillonite minerals. 7M

   b) A sample of saturated soil has a water content of 25% and unit weight of 20 kN/m^3. Determine dry density, void ratio and specific gravity of solid particles. What would be the bulk unit weight of the soil at the same void ratio but at a degree of saturation of 80%. Take γ_w=10 kN/m^3. 7M

UNIT-II

3. a) Derive the expression for critical hydraulic gradient. 7M

   b) The falling-head permeability test was conducted on a soil sample of 4 cm diameter and 18 cm length. The head fell from 1.0 m to 0.40 m in 20 minutes. If the cross- section area of the stand pipe was 1 cm2, determine the coefficient of permeability. 7M

(OR)

4. a) Explain the uses of flow net 7M

   b) What are the different methods for determination of coefficient of permeability in laboratory? Discuss their limitations. 7M

UNIT-III

5. a) A soil profile consists of a surface layer of clay 4 m thick (γ = 19.5 kN/m^3) and a sand layer 2 m thick (γ = 18.5 kN/m^3) overlying an impermeable rock. The water table is at the ground surface. If the water level in a standpipe driven into the sand layer rises 2 m above the ground surface, draw the plot showing the variation of total, neutral and effective stresses. Take γ_w = 10 kN/m^3. 7M

   b) Calculate the vertical stress at a point P at a depth of 2.5 m directly under the centre of the circular area of radius 2m and subjected to a load 100 kN/m^2. Also calculate the vertical stress at a point Q which is at the same depth of 2.5 m but 2.5m away from the centre of the loaded area. 7M

(OR)

6. a) A sand deposit is 10m thick and overlies a bed of soft clay. The ground water table is 3m below the ground surface. If the sand above the ground water table has a degree of saturation of 45%, plot the diagram showing the variation of the total stress, pore Water pressure and the effective stress. The void ratio of the sand is 0.70. take G=2.65. 6M

   b) An L – shaped building in plan (Fig.1) exerts a pressure of 75 kN/m^2 on the soil. Determine the vertical stress increases at a depth 5 m below the interior corner P. 8M

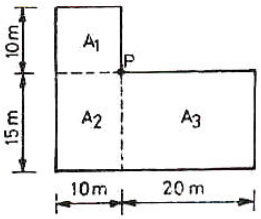


Fig.1

UNIT-IV

7. a) The following results were obtained from a standard compaction test on a sample of soil. 10M

Water content (%)	0.12	0.14	0.16	0.18	0.20	0.22
Mass of the wet soil (kg)	1.68	1.85	1.91	1.87	1.87	1.85

The volume of the mould used was 950 ml. make necessary calculation and plot the compaction curve and obtain the maximum dry density and the optimum water content. Also calculate the void ratio, the degree of saturation and the theoretical maximum dry density (G = 2.70).

   b) Differentiate between consolidation and compaction. 4M

(OR)

8. a) Describe briefly the procedure to compute the pre-consolidation pressure. 7M

   b) Explain the consolidation process with spring analogy mechanism. 7M

UNIT-V

9. a) A series of consolidated-undrained triaxial tests was conducted on an over-consolidated clay and the following results were obtained. 10M

Sample No.	Cell pressure (kN/m^2)	Deviator stress (kN/m^2)	Pore-water pressure (kN/m^2)
1	125	510	-70
2	250	620	-10
3	500	850	+120

Plot the strength envelopes in term of total stresses and effective stresses, and hence determine the strength parameters.

   b) What are the three standard tri axial shear tests with respect to drainage conditions? 4M

(OR)

10. a) Describe the triaxial shear test. What are the advantages of triaxial shear test 8M

    b) A series of direct shear test was conducted on a soil, each test was carried out till the sample failed. The following results were obtained 6M

Sample No.	Normal stress(kN/m^2)	Shear stress(kN/m^2)
1	15	18
2	30	25
3	45	32

Determine the cohesion intercept and the angle of shearing resistance.

AR16

CODE: 16ME3017 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October,2023

INSTRUMENTATION AND CONTROL SYSTEMS
(MECHANICAL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Explain the Dynamic performance characteristics	7M
	b)	What are Transducers and how are they classified? Explain their importance in an instrumentation process	7M
		(OR)	
2.	a)	Write the principle and working of seismic type accelerometer	7M
	b)	What are the various errors occur in the measuring instruments and explain the methods of elimination	7M

UNIT-II

3.	a)	Discuss in detail electrical strain gauge with a necessary diagram	7M
	b)	Explain the stroboscope speed measurement	7M
		(OR)	
4.	a)	Explain with a neat sketch of strain gauge load cell	7M
	b)	Explain Electrical resistance strain gauges	7M

UNIT-III

5.	a)	Explain the Ionization type pressure gauges	7M
	b)	Explain the Mcleod vacuum gauges used for pressure measurement and its limitations	7M
		(OR)	
6.	a)	What is a thermistor? How is it used for temperature measurement	7M
	b)	Explain the resistive level measurement	7M

UNIT-IV

7.	a)	Explain with a neat sketch of Hot-wire anemometer	7M
	b)	What are the factors affecting Recording Type Psychrometer	7M
		(OR)	
8.	a)	Discuss in detail Dew point meter	7M
	b)	Explain the measurement of flow rate using ultrasonic flow meter?	7M

UNIT-V

9.	a)	Describe with neat sketch the open loop speed control system	7M
	b)	Illustrate with example, explain closed loop temperature control system	7M
		(OR)	
10.	a)	With a neat sketch explain the position control system	7M
	b)	Describe a speed control system for controlling speed of an I.C. engine	7M

AR18

CODE: 18CET311 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October, 2023

Geotechnical Engineering-I

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Explain about soil formation briefly	6M
	b)	An undisturbed sample of soil has a volume 100 cm^3 & mass 200 g on oven drying for 24 hrs, the mass is reduced to 170 g. If G=2.68, determine void ratio, water content & degree of saturation	6M
		(OR)	
2.	a)	A soil sample is found to have the following properties. Classify the soil according to I.S. classification system. Passing 75micron sieve =10% Passing 4.75mm sieve =70% Uniformity coefficient =8 Coefficient of curvature =2.8 Plasticity index =4	6M
	b)	Derive the relation between void ratio, water content, saturation and specific gravity	6M

UNIT-II

3.	a)	Explain constant head permeability test procedure with a neat sketch	6M
	b)	A falling head permeability test is to be performed on a soil sample whose coefficient of permeability is $3x10^{-5}$ cm/s. What diameter of the standpipe should be used if the head is to drop from 27.5cm to 20.0cm in 5 minutes and if the cross sectional area and length of the sample are respectively 15cm^2 and 8.5cm?	6M
		(OR)	
4.	a)	Enumerate and briefly explain the factors affecting permeability of a soil.	6M
	b)	State Darcy's law and define coefficient of permeability. What are the limitations in the application of Darcy's law to flow through soil media.	6M

UNIT-III

5.	a)	Compare Boussinesq and westergaurd theories.	6M
	b)	A 5m thick sand layer with specific gravity 2.67 and void ratio 0.6 is underlain by a bed of 4m clay having saturated unit weight 20 kN/m^3. Plot the total, neutral & effective stress distribution diagram up to the bottom of clay layer, when 1) Water table is at 2m below Ground surface (S = 50% above WT) 2) Water table is at ground surface	6M
		(OR)	
6.	a)	With a sketch explain the construction of a Newmark's chart	6M
	b)	Three parallel strip foundations each 3m wide 5m apart centre to centre transmit contact pressures of 200KN/m^2,150 KN/m^2 and 100KN/m^2 respectively. calculate the intensity of vertical stress due to the combined loads beneath the centre of each footing at 3m depth. Use Boussinesq line load approximation.	6M

UNIT-IV

7. a) What is compaction of soil? How does it differ from consolidation? Describe briefly the different methods of compaction .state their relative merits and demerits. 8M

   b) Write short notes on effect of compaction on soil properties. 4M

(OR)

8. a) Explain procedure of 1-D consolidation test 6M

   b) How many days would be required by a clay stratum 5m thick, drained at both ends with coefficient of consolidation of 50×10^{-4} cm^2/sec to attain 50% of its ultimate settlement? Given $T_{50} = 0.197$ 6M

UNIT-V

9. a) What is coulombs equation for shear strength of soil ? Discuss the factors that affect the shear strength parameters of soil. 6M

   b) An insitu vane shear test was conducted in a clay soil at the bottom of a bore hole. A torque of 153Nm was required to shear the soil. What was the undrained strength of the clay? The vane was 100mm in diameter and 150mm long. 6M

(OR)

10. An unconfined compression test was conducted on an undisturbed sample of clay. The sample had a diameter of 37.5 mm and 80 mm long. The load at failure measured by proving ring was 28 N and the axial deformation of the sample at failure was 13mm. Determine the unconfined compressive strength and the undrained shear strength of the clay. 12M

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AR18

CODE: 18CST312 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October, 2023

Artificial Intelligence & Machine Learning

(COMMON TO CSE & IT)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Explain state space search with water jug problem.	6 M
	b)	Explain uniform search strategy. Explain Breadth-First Search algorithm with example.	6 M

(OR)

2.	a)	Define artificial intelligence with its need. Mention some real-world applications of AI.	4 M
	b)	What is an AI technique and explain with example of Tic-Tac-Toe.	8 M

UNIT-II

3.	a)	Explain how Simple facts are converted into Propositional Logic with relevant example.	6 M
	b)	Write Unification algorithm and give an example.	6 M

(OR)

4.	a)	Describe the importance of Alpha-Beta pruning in searching.	4 M
	b)	Explain the algorithm to convert well-formed formula to Clause form using the well-formed formula: "∀x: [Roman(x) ^ know(x, Marcus)] → [hate(x, Caesar) V (∀y : (∃z : hate(y, z)) → thinkcrazy(x, y))]"	8 M

UNIT-III

5.	a)	Explain the rule-based system with its architecture.	6 M
	b)	Consider the following problem. • John likes all kinds of food. • Apples are food. • Chicken is food. • Anything any one eats and isn't killed by is food. • Bill ate peanuts and still alive. • Sue eats everything Bill eats. (a) Translate these sentences into formulas in predicate logic. (b) Prove that "John likes peanuts" using backward chaining.	6 M

(OR)

6.	a)	Explain about Semantic Nets.	6 M
	b)	Write about Partitioned Semantic Nets.	2 M
	c)	Draw the Partitioned Semantic Net for "Every dog has bitten a mail carrier".	4 M

UNIT-IV

7. a) Explain well posed learning problems with proper examples. 6 M
   b) Explain concept learning as search with relevant example. 6 M

(OR)

8. a) Briefly describe the issues in Machine learning. 5 M
   b) Implement FIND-S algorithm on the data given below to find the maximal specific hypothesis 7 M

Example	*Sky*	*AirTemp*	*Humidity*	*Wind*	*Water*	*Forecast*	*EnjoySport*
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

UNIT-V

9. a) Describe basic decision tree learning algorithm with an example. 8 M
   b) Write notes on 4 M
      i) Bayes Theorem
      ii) Naïve Bayes classifier.

(OR)

10. a) Explain Naïve Bayes Classifier. 6 M
    b) Calculate the Entropy(S) for the data given below and also find Gain (S, Wind). 6 M

Day	*Outlook*	*Temperature*	*Humidity*	*Wind*	*PlayTennis*
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

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AR18

CODE: 18ECT312 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October, 2023

CONTROL SYSTEMS

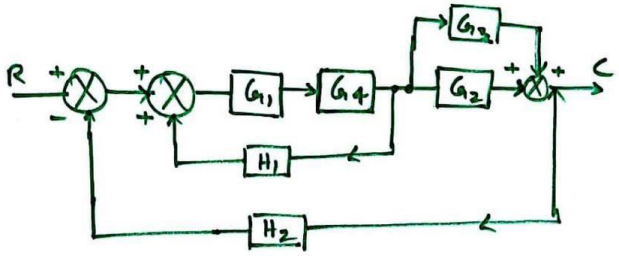
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

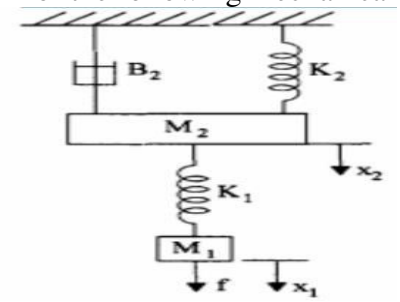
1. a) Determine the transfer function by Block reduction technique 6M



b) Compare Open Loop and Closed Loop System. 6M
Explain the effect of Feedback on sensitivity and Disturbance.

(OR)

2. Obtain the transfer function for the following mechanical translational system. 12M



UNIT-II

3. A unity feed back system is characterized by an open loop transfer function G(s)= K/s(s+5). Determine the gain K so that the system will have a damping factor of 0.7. For this value of K determine the natural frequency of the system. It is subjected to a unity step input. Obtain the closed loop response of the system in time domain. 12M

(OR)

4. For the given open loop transfer function G(s) with a unity feedback system, find the error constants and steady state error for different inputs. 12M

$$G(s) = \frac{20(s+2)}{s(s+1)(s+3)}$$

UNIT-III

5. a) Construct Routh array, determine stability and find the location of roots for the systems represented by the following characteristic equation. 6M

$$s^4 + 8s^3 + 18\,s^2 + 16\,s + 5 = 0$$

b) Explain the rules for sketching root locus 6M

(OR)

6. A feedback Control Systems has an open loop transfer function: 12M

$G(S)H(s) = \frac{K}{s(s+3)(s+5)}$ sketch the root locus

UNIT-IV

7. 1. Draw Bode plot for a control system having transfer 12M

function $G(s)H(s) = \frac{100}{s(s+1)(s+2)}$

Determine (i) gain margin, (ii) phase margin, (iii) gain cross-over frequency, and (iv) phase cross over frequency.

(OR)

8. The open loop transfer function of a negative feedback control system is 12M

given by $G(s)H(s) = \frac{K}{(S+1)(S+2)(S+3)}$

Using Nyquist stability criterion, find the range of values of K for which the system remains stable.

UNIT-V

9. The open loop transfer function of a unity feedback system is 12M

$G(s) = \frac{K}{s(s+2)}$

Design a lead compensator to have a velocity-error constant of 20 s-1 and a phase margin of atleast 50^0.

(OR)

10. a) Explain the properties of State Transition Matrix 6M

b) 6M

A state model of a system is given as, $\dot{X} = \begin{bmatrix} 2 & 2 \\ -4 & 3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 2 \end{bmatrix} U$ and

$Y = \begin{bmatrix} 0 & 1 \end{bmatrix} X$. Find the transfer function Y(S)/R(S).

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AR18(RA)

CODE: 18EEE311 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular/Supplementary Examinations, October, 2023

INTEGRATED CIRCUITS APPALICATIONS

(ELECTRONICS AND ELECTRICAL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Briefly explain the necessity and function of different stages of op-Amp with respect to its block diagram. 8M

   b) Explain the DC Characteristics of an op-amp in detail. 4M

(OR)

2. a) A square wave of peak to peak amplitude of 500mV has to be amplified to a peak to peak amplitude of 3 Volts, with a rise time of 4 μsec or less. Can a 741 be used? 6M

   b) Derive expressions for voltage gain and input resistances of voltage shunt feedback configuration of operational amplifier. 6M

UNIT-II

3. a) For the circuit shown below Fig.1, taking the op-amp as ideal, the output voltage V_{out} in terms of the input voltages V_1, V_2 and V_3 is 6M

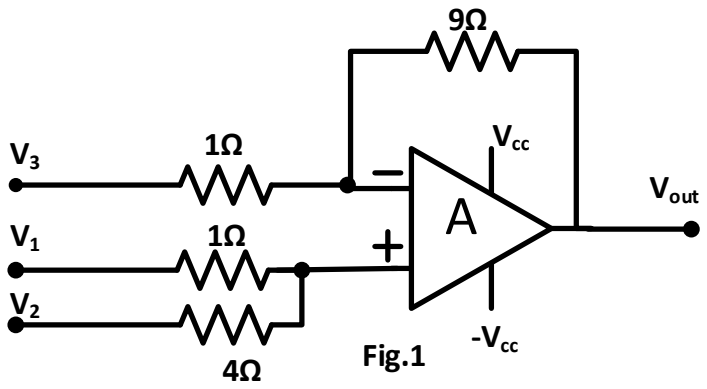

Fig.1

   b) Explain how an op-amp can be used as integrator? Also derive expression for the output. 6M

(OR)

4. a) Explain the operation of Inverting comparator with neat circuit and draw the input ,output waveforms for positive reference voltage ,$(+V_{ref})$ 6M

   b) A Schmitt trigger with the upper threshold level V_{UT}=0V and hysteresis width V_H=0.2V converts a 1 kHz sine wave of amplitude $4V_{pp}$ into a square wave. Calculate the time duration of the negative and positive portion of the output waveform. 6M

UNIT-III

5. a) Define active filter. List out different filters and sketch the frequency response of them. 6M
   b) Design a low pass filter with a cut off frequency of 1 kHz and with a pass band gain of 2. 6M

(OR)

6. a) Draw the circuit diagram of first order high pass filter and its frequency response. Derive the expression for output voltage. 6M
   b) Design the Narrow band pass filter with two feedback paths having f_c=1.5kHz,Q=7 and A_F=15.Calculate the new value of resistance in the circuit which will change f_c to 2 kHz. Choose $C_1=C_2=C=0.02\mu F$. 6M

UNIT-IV

7. a) Explain the operation of an op-amp based weighted resistor digital to analog converter through a neat circuit diagram. 8M
   b) Write the draw backs of counter type analog to digital converter and list out the ways to overcome these drawbacks. 4M

(OR)

8. a) The logic levels used in an 8-bit R-2R ladder type DAC are logic '1' = +5 Volts and logic '0' = 0 Volts. Find the output voltage for an input of 10110110. 6M
   b) A dual slope ADC uses a 16-bit counter and a 4 MHz clock rate. The maximum input voltage is +10V. The maximum integrator output voltage should be -8V when the counter has cycled through 2n counts. The capacitor used in the integrator is 0.1μF.Find the value of the resistor R of the integrator. 6M

UNIT-V

9. a) Draw and explain the functional diagram of a 555 Timer. 6M
   b) Draw the circuit of a Schmitt trigger using 555 Timer and explain its operation. 6M

(OR)

10. a) To construct and observe the waveforms of a1kHz square waveform generator using 555 timer for duty cycle, D=0.25. 4M
    b) Explain the operation of 555 timer as Monostable multivibrator and also derive the expression of pulse width in Monostable operation. 8M

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