CODE: 20IET321   **SET-1**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular Examinations, January,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 $(P^c)^c = P$.

   Marks: 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 $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$,(iii) C^c (iv)$A \cup (B \cup C)$ (v) $(A \cup B) \cup C$

   Marks: 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 $(i)S = C \times B$ $(ii)R = A \times B$ $(iii)\ S \circ R$

   Marks: 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 $Z = \{z_1, z_2, z_3\}$,

   $R = \begin{array}{c} x_1 \\ x_2 \end{array}\begin{bmatrix} y_1 & y_2 \\ 0.7 & 0.5 \\ 0.8 & 0.4 \end{bmatrix}$ and $S = \begin{array}{c} y_1 \\ y_2 \end{array}\begin{bmatrix} z_1 & z_2 & z_3 \\ 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{bmatrix}$. Find the relation $T = R \circ S$ which relates the elements of universe X to Z by $using\ max - min\ composition.$

   Marks: 5 CO2 Applying

| b) | Show that $R = \begin{array}{c} x_1 \\ x_2 \end{array}\begin{bmatrix} x_1 & x_2 \\ 1.0 & 0.5 \\ 0.8 & 1.0 \end{bmatrix}$ 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 $A \to B$. | 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 $\alpha=1$, $\beta=0.164$, $\vartheta=1.074$, 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 |

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
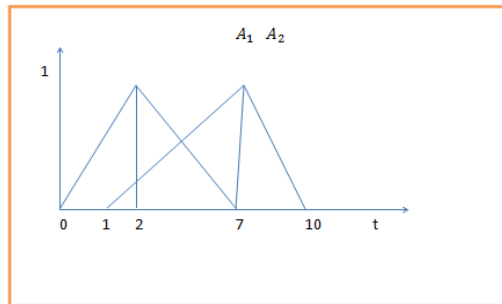
(OR)

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) and range of I1: [0,15], I2: [0,3].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   10   CO6   Applying
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:

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

AR20

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)	Justify the role and potential of solar energy as a renewable source.	5	CO1	Applying
	b)	Briefly explain about solar radiation with necessary diagram.	5	CO1	Analyzing
		(OR)			
2.		Explain about solar radiation measuring devices with the help of neat sketch.	10	CO1	Analyzing
UNIT-II					
3.		Classify about Solar radiation collectors with the help of neat diagrams.	10	CO2	Understanding
		(OR)			
4.	a)	List the application of solar radiation?	5	CO2	Understanding
	b)	Describe about solar distillation with the help of neat sketch.	5	CO2	Applying
UNIT-III					
5.		Derive the maximum power that can be extracted from the wind using wind turbine	10	CO3	Applying
		(OR)			
6.	a)	What are the advantages and limitations of wind energy?	4	CO3	Understanding
	b)	Compare between Horizontal and vertical axis wind turbines?	6	CO3	Analyzing
UNIT-IV					
7.	a)	What are the advantages and limitations of Biomass energy?	4	CO4	Understanding
	b)	Explain about KVIC digester with the help of neat sketch?	6	CO4	Analyzing
		(OR)			
8.	a)	List the advantages and disadvantages of geothermal energy?	4	CO4	Understanding
	b)	Describe about Vapour dominated Geothermal source with the help of diagram?	6	CO4	Applying
UNIT-V					
9.	a)	List the advantages and disadvantages of ocean energy?	4	CO5	Understanding
	b)	What is the working principle of OTEC plant with the help of neat sketch?	6	CO5	Understanding
		(OR)			
10.	a)	List the advantages and disadvantages of Tidal energy?	4	CO5	Understanding
	b)	Explain Single basin single effect tidal plant with the help of diagram?	6	CO5	Analyzing
UNIT-VI					
11.	a)	Define Hall effect and write its applications	4	CO6	Remembering
	b)	Explain the working principle of MHD generator with the help of neat sketch?	6	CO6	Analyzing
		(OR)			
12.	a)	List the advantages MHD generation of energy?	4	CO6	Understanding
	b)	Explain about open cycle MHD with the help of diagram?	6	CO6	Analyzing

AR20

CODE: 20ITE325   SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular Examinations, December-2022
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

		UNIT-I	Marks	CO	Blooms Level
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 $m(t)=\cos(2\pi\times10^3 t)$ is amplitude modulated with a carrier signal $c(t)=5\cos(2\pi\times10^5 t)$. 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 $m(t)=5\cos(2\pi\times10^3 t)$.	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

CODE: 20IET326   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular Examinations, January,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)	What is an operator? Explain different types of operators in java language.	5M	CO1	K1
	b)	List and explain Java Features, in detail.	5M	CO1	K1
		(OR)			
2.	a)	List out the selection control statements available in Java. Explain with example	5M	CO1	K2
	b)	List out the looping statements available in Java. Explain with example	5M	CO1	K2
		UNIT-II			
3.	a)	What is a method? Explain method overloading concept with one example	5M	CO2	K1
	b)	What is a constructor? Explain constructor overloading concept with one example	5M	CO2	K1
		(OR)			
4.	a)	Explain the usage of static keyword in Java.	5M	CO2	K2
	b)	Explain final keyword with example	5M	CO2	K2
		UNIT-III			
5.	a)	What is an inheritance? Explain different types of inheritance with one example	5M	CO3	K1
	b)	Explain super keyword with example.	5M	CO3	K2
		(OR)			
6.	a)	Describe the various forms of implementing interface. Give an example of JAVA code for each case.	5M	CO3	K1
	b)	Explain the concept of method overriding with one example	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 handling in java	5M	CO4	K1
		(OR)			
8.	a)	Explain User Defined Exceptions with one example	5M	CO4	K2
	b)	Write a java program to implement throw keyword with one example	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 multiple threads	5M	CO5	K3
		(OR)			
10.	a)	Explain Thread Priorities with one example	5M	CO5	K2
	b)	Explain Thread Synchronization with one example	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

CODE: **20IET327**   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular Examinations, January-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.	a	Explain the structure of Database Management System with a neat diagram.	6	C0-1	K2
	b	Demonstrate data abstraction implementation in DBMS.	4		
		(OR)			
2.	a	Distinguish File systems from DBMS.	5	CO-1	K4
	b	Explain various data models in DBMS.	5		K2
UNIT-II					
3.	a	Define an Entity and attribute. Explain the different types of attributes that occur in Entity Relationship model, with an example diagram.	5	CO-2	K1
	b	Draw an ER diagram of an Hospital Management system.	5		K3
		(OR)			
4.	a	Draw an ER diagram of an airlines reservation system.	5	CO-2	K3
	b	Discuss the representation of total participation and multivalued attribute in an E/R diagram.	5	CO-2	K6
UNIT-III					
5.	a	What is datatype? Explain data types in SQL.	5	CO-3	K1
	b	Explain aggregate functions with suitable examples.	5		K2
		(OR)			
6.	a	Write about DDL and DML Commands with proper syntax and with example.	10	CO-3	K1
UNIT-IV					
7.	a	What is query? and explain nested query with example.	5	CO-4	K1
	b	Write PL/SQL program to check given number is even or odd.	5		K1
		(OR)			
8.	a	Explain various join operations with examples.	10	CO-4	K2
UNIT-V					
9.	a	What is normalization? Why do we need to normalize our database? Explain various normal forms by taking proper examples	10	CO-5	K1
		(OR)			
10.	a	Describe problems caused by Redundancy.	5	CO-5	K2
	b	Write the properties of functional dependencies	5		K1
UNIT-VI					
11.	a	Define transaction and explain desirable properties of transactions.	5	CO-6	K1
	b	Explain briefly Primary and Secondary index.	5		K2
		(OR)			
12.	a	Discuss the issues in handling concurrent transactions.	5	CO-6	K2
	b	Discuss about the implementation of atomicity and durability.	5		K2

AR20

CODE: 20IET328   SET-1
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular Examinations, Januray-2023
ADVANCED CODING – 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)	Implement function for reversing a singly liked list without using extra space?	5	CO1	K1
	b)	Given an array, print the next grater element for every element, elements which do not have any grater elements consider the next grater element as -1. Input: arr[] = [13,7,6,12] Output :13 -> -1 7-> 12 6 -> 12 12 -> -1	5	CO1	K3
		(OR)			
2.	a)	Define Queue and implement circular queue using array (enqueue and dequeue)?	5	CO1	K1
	b)	Give a efficient approach to identify the middle element of the singly linked list in order of length of the list?	5	CO1	K2
		UNIT-II			
3.	a)	Explain about quick sort technique and discus the time and space complexity of quick sort technique?	5	CO2	K1
	b)	Given an array of n elements such that elements may repeat. you can delete any number of elements from the array. The task is to find a minimum number of elements to be deleted form the array to make it equal. Input: arr[] = {4,3,4,4,4,2,4} Output: 2 Explanation: deleting 2 and 3 from array, array becomes arr[] = {4,4,4,4}	5	CO2	K3
		(OR)			
4.	a)	what is collision in hashing and explain different collision resolution techniques with examples?	5	CO2	K1
	b)	Given an array of both positive and negative integers arr[] which are sorted. The task is to sort the square of the numbers of the array in order of N where N is the number of elements in the array. Input: arr[] = {-6,-3,-1,2,4,5} Output: 1,4,9,16,25,36	5	CO2	K2

5. a) Construct the post order tree for the given pre order and in order traversal

   inorder : 40,20,50,10,60,30

   pre order: 10,20,40,50,30,60   5   CO3   K1

   b) Construct BFS for given below graph? Consider vertex S as the starting vertex?   5   CO3   K2
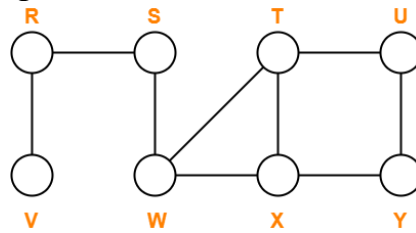
(OR)

6. a) Explain Binary search tree and implement function for searching in BST?   5   CO3   K1

   b) Explain the graph representations i) Adjacency matrix and ii) Adjacency list?   5   CO3   K1

UNIT-IV

7. a) Explain about the fractional knapsack problem?   5   CO4   K1

   b) Given a paper of size A x B. Task is to cut the paper into squares of any size. Find the minimum number of squares that can be cut from the paper.   5   CO4   K2

   Input: 13 x 29

   Output: 9

   Explanation: 2 (squares of size 13 x 13) +

              4 (Squares of size 3 x 3) +

              3 (squares of size 1 x 1) = 9

(OR)

8. a) Explain about the job scheduling problem?   5   CO4   K1

   b) Given the arrival and departure times of all trains that reach a railway station, the task is to find the minimum number of platforms required for the railway station so that no train waits, you are given two arrays that represent the arrival and departure times of trains that stop.   5   CO4   K3

   Input: arr[] = {9:00, 9:40, 9:50, 11:00, 15:00, 18:00},

           Dep[] = {9:10, 12:00,11:20, 11:30, 19:00, 20:00}

   Output: 3

UNIT-V

9. a) Explain about KMP algorithm?   5   CO5   K1

   b) Given an array a, we have to find the minimum product possible with the subset of elements present in the array. The minimum product can be a single element also.   5   CO5   K2

   Input : a[] = { -1, -1, -2, 4, 3 }

   Output : -24

   Explanation : Minimum product will be (-2 * -1 * -1 * 4 * 3) = -24

(OR)

10.	a)	Given an array of size n that has the following specifications: Each element in the array contains either a policeman or a thief. Each policeman can catch only one thief. A policeman cannot catch a thief who is more than K units away from the policeman. you need to find the maximum number of thieves that can be caught. Input : arr[] = {'P', 'T', 'T', 'P', 'T'}, k = 1. Output : 2. Here maximum 2 thieves can be caught, first policeman catches first thief and second police-man can catch either second or third thief.	5	CO5	K3
	b)	Given a binary string S, return the number of non-empty substrings that have the same number if 0's and 1's, and all the 0's and all the 1's in these substrings are grouped consecutively. Substrings that occur multiple times are counted the number of times they occur. Input: "00110011" Output: 6	5	CO5	K2

UNIT-VI

11.	a)	Given a "2 x n board and tiles of size "2 x 1". Count the number of ways to tile the given board using the 2 x 1 tiles. A tile can either be placed horizontally I.e, as a 1 x 2 tile or vertically i.e 2 x 1 tile. Input: n = 4 Output: 5 For a 2 x 4 board, there are 5 ways All 4 vertical (1 way) All 4 horizontal (1 way) 2 vertical and 2 horizontals (3 ways)	5	CO6	K2
	b)	Given a gold mine of n*m dimensions. Each filed in this mine contains a positive integer which is the amount of gold in tons. Initially the miner is at first column but can be at any row. He can move only (right->, right up/,right down\) that is from a given cell, the miner can move to the cell diagonally up towards the right or diagonally down towards the right. Find out maximum amount of gold he can collect. Input: mat[][] = {{1,3,3},{2,1,4},{0,6,4}} Output: 12	5	CO6	K2

(OR)

12. a) Given an input sequence array, Find the longest increasing subsequence of a given array such that all elements of the subsequence are in the increasing order.
   Input : arr[] = {3,10,2,1,20}
   Output: Length of LIS = 3
   The longest increasing subsequence is 3,10,20   5   CO6   K3

   b) Given an array of size N. the task is to find the sum of the contiguous subarray within a arr[] with the largest sum.
   Input: arr[] = {-2, -3, 4 -1, -2, 1, 5, -3}
   Output: 7
   Explanation: 4 +(-1) +(-2) +1+5 = 7   5   CO6   K2

AR20

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	Marks	CO	Blooms Level
1.	a)	Explain Naïve and Euclid's algorithm of GCD.	5	CO1	Understand
	b)	Write a program for extended Euclid's algorithm	5	CO1	Understand
		(OR)			
2.	a)	What is multiplicative inverse and modular multiplicative inverse?	5	CO1	Understand
	b)	Explain naïve and better approach of prime numbers.	5	CO1	Understand
		UNIT-II			
3.	a)	What is a circular linked-list? Explain with an example.	5	CO2	Analyze
	b)	Write code for deleting middle element from the singly linked list.	5	CO2	Apply
		(OR)			
4.	a)	Write an algorithm for insert a node in the middle of the DLL.	5	CO2	Analyze
	b)	How to search for an element in the single linked list? Explain.	5	CO2	Apply
		UNIT-III			
5.	a)	Write Algorithm for Linear Search. Illustrate search for 38 and 69 in the given list of elements: 13 9 25 11 38 64 42 20	5	CO3	Apply
	b)	Illustrate Quick sort for the following elements step by step and explain: 23,56,14,34,58,97,72,69,36.	5	CO3	Analyze
		(OR)			
6.	a)	Write Algorithm for Binary Search. Illustrate search 77 and 12 in the given list of elements:13 19 25 31 38 42 51 65 77 95	5	CO3	Apply
	b)	Explain about Recursive merge sort with suitable example.	5	CO3	Understanding
		UNIT-IV			
7.	a)	Write an algorithm for implementing stacks using Arrays. Explain	5	CO4	Apply
	b)	Write an algorithm for implementing queues using linked list. Explain with an example.	5	CO4	Analyz
		(OR)			
8.	a)	Write an algorithm for implementing stack using linked list. Explain	5	CO4	Understand
	b)	Write an algorithm for implementing queues using Arrays. Explain	5	CO4	Understand
		UNIT-V			
9.	a)	Define binary search tree. Show how to insert and delete an element from binary search tree.	5	CO5	Analyze
	b)	What is a graph? Explain the properties of graphs.	5	CO5	Apply
		(OR)			
10.	a)	Write breadth first traversal algorithm. Explain with an example.	5	CO5	Analyze
	b)	Write algorithm to insert and delete an element from binary search tree.	5	CO5	Apply
		UNIT-VI			
11.	a)	How 0/1 knapsack problem can be solved by using dynamic programming approach?	5	CO6	Apply
	b)	Write an algorithm for implementing egg dropping problem.	5	CO6	Analyze
		(OR)			
12.	a)	Write an algorithm for implementing rod cutting problem.	5	CO6	Apply
	b)	Distinguish between bottom up and top down approach.	5	CO6	Analyze

AR18

CODE: 18CET311   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, January,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) A soil sample of 3.81cm diameter and 7.62cm height is collected from the field and observed the wet weight of 1.668N and oven dry weight of 1.4N from the laboratory. Also observed the specific gravity as 2.7 in the laboratory. Evaluate the bulk unit weight, dry unit weight, void ratio and degree of saturation   6M
    b) If Uniformity coefficient, C_u= 9, and coefficient of curvature, C_c=1 for a soil, what will the ratio of D_{30}/D_{10}?   6M

(OR)

2. a) The natural void ratio of sand sample is 0.6 and its density index is 0.6. If its void ratio in the loosest state is 0.9, then what will be the void ratio in the densest state?   6M
    b) For a given sandy soil, emax = 0.72, emin = 0.46, and Gs = 2.68. What will be the moist unit weight of compaction (kN/m3) in the field if Dr = 78% and w = 9%.   6M

UNIT-II

3. a) Explain the darcy's law assumption and state the permeability constant.   6M
    b) A soil block is 12 cm long and 8 cm2 in cross –section from a fixed level. The water level at one end of block is 15 cm and on the other end is 2 cm with a flow rate of 2 cm3/minute. What is the soil permeability?   6M

(OR)

4. a) A clay layer 3.66 m thick rests beneath a deposit of submerged sand 7.92 m thick. The top of the sand is located 3.05 m below the surface of a lake. The saturated unit weight of the sand is 19.62 kN/m3 and the clay is 18.36kN/m3. Evaluate the total stress, pore water pressure and the effective stress at the middle of the clay layer.   6M
    b) In a falling head permeameter, a soil sample of 65 mm in diameter and 50 mm in length was tested. At the beginning of the test, the head was 80 cm, and after 1 hour, the head falls to 30 cm. if the diameter of the stand pipe is 1 cm, what will be the coefficient of permeability in cm/sec?   6M

UNIT-III

5. a) Describe the Newmark's chart and its application.   6M
    b) A column of a building transfers a concentrated load of 225kN to the soil in contact with the footing. Estimate the vertical pressure at the following points by making use of the Boussinesq and Westergaard equations.   6M
        (i) Vertically below the column load at depths of 1.5, 3.0, and 4.5 meters.
        (ii) At radial distances of 1.5, 3.0 and 6.0 meters and at a depth of 3.0 meters.

(OR)

6. a) A square footing of 3.5 x 3.5 meters is founded at a depth of 1.5 meters below the ground level. The imposed pressure at the base is 1200kN/m2. Determine the vertical pressure at a depth of 7 meters below the ground surface on the center line of the footing. **6M**

   b) A concentrated load of 22.5kN acts on the surface of a homogeneous soil mass of a large extent. Find the stress intensity at a depth of 3m, 6m, 9m, 12m and 15m directly below the point load. Draw the vertical stress distribution diagram along vertical axis **6M**

UNIT-IV

7. a) There is a clay layer 10 m thick sandwiched between the layers of sand. An undisturbed sample 2.5 cm thick of the clay when tested in the laboratory required 26 minutes to reach 50% consolidation [TV = 0.20]. It is proposed to construct a building at the above site. Estimate the time required for 90% consolidation to take place. Also report the time required in years. **6M**

   b) The mass of a moist soil sample collected from the field is 465 grams, and its oven dry mass is 405.76 grams. The specific gravity of the soil solids was determined in the laboratory to be 2.68. If the void ratio of the soil in the natural state is 0.83, find the following: **6M**
   - a. The moist density of the soil in the field (kg/m3)
   - b. The dry density of the soil in the field (kg/m3)
   - c. The mass of water, in kilograms, to be added per cubic meter of soil in the field for saturation

(OR)

8. a) Write the difference between compaction and consolidation **8M**
   b) What are the various assumptions made in Terzaghi's one dimensional consolidation? **4M**

UNIT-V

9. a) Explain about direct shear test with a neat sketch. **7M**
   b) Write about mohr coulomb theory and state shear strength equation. **5M**

(OR)

10. a) The principal stresses at a point in a material are $100kN/m^2$ and $50kN/m^2$. Determine the Normal, Shear and Resultant Stress on a plane inclined at 35^0 to the major principal plane. Also find, for this plane, the maximum value of Obliquity. **6M**

    b) An unconsolidated undrained triaxial test was carried out on a sample of dry sand, prepared with special techniques. Under a cell pressure of 200kPa, shear failure of the sample occurred when the deviator stress reached 438.6kPa. Determine the shear parameters of the soil? **6M**

CODE: 18EEE311   SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, January-2023
INTEGRATED CIRCUITS APPALICATIONS
(Electrical and Electronics 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 various AC characteristics of Op-amp   6M
   b) Explain about Input offset current, input offset voltage, Thermal drift   6M

(OR)

2. a) What is an Op-Amp? Draw the functional block diagram of an Op-Amp and explain each block in detail.   6M
   b) Explain the most important parameters of an operational amplifier. What are their ideal values and practical values?   6M

UNIT-II

3. a) Draw the circuit diagram of a practical differentiator and explain its operation with relevant expressions.   6M
   b) Draw a single op-amp Integrator circuitand derive the relation between the output and input voltage   6M

(OR)

4. a) Draw the circuit diagram of Non-inverting summing amplifier and explain its operation.   6M
   b) Derive the expression for frequency of Astable Multivibrator using op-amp.   6M

UNIT-III

5. a) Draw a band pass filter circuit with its frequency response curve. Explain its working   6M
   b) What is an all pass filter? Explain in detail.   6M

(OR)

6. a) Draw an inverting first order low-pass filter using op-amp and draw its frequency response curve.   6M
   b) Draw the circuit diagram of second order high pass filter and derive its output response   6M

UNIT-IV

7. a) Explain the operation of weighted resistor type of DAC with a neat diagram and also write its advantages.   6M
   b) Draw the simplified block diagram of a successive approximation ADC and explain its working.   6M

(OR)

8. a) Explain in detail the operation of 3-bit parallel ADC with a neat circuit diagram.   6M
   b) Draw the circuit diagram of R-2R DAC and explain its operation in detail   6M

UNIT-V

9. a) Draw the circuit diagram of a 555 timer connected as an astable multivibrator and explain its operation.   6M
   b) Draw the block diagram of 555 Timer and explain each block in it.   6M

(OR)

10. a) Draw the circuit diagram, explain how 555 timer is used as Schmitt Trigger?   6M
    b) Draw the circuit diagram of Monostable multivibrator by using 555 Timer and explain its operation   6M

AR18

CODE: 18MET312   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, January,2023

APPLIED THERMODYNAMICS
(Mechanical 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 the significance of difference lines on Mollier diagram   6M
   b) Explain the working of seperating calorimeter with neat sketch   6M

(OR)

2. a) Explain the working of reheat cycle with help of p-v and T-s diagrams   6M
   b) In a steam power cycle, the steam supply is at 15 bar and dry and saturated. The condenser pressure is 0.4 bar. Calculate the Rankine efficiency of the cycle. Neglect pump work   6M

UNIT-II

3. a) Explain the working principle of locomotive boiler with neat sketch   6M
   b) Explain the working of dead weight safety valve with neat sketch   6M

(OR)

4. A 40-m high chimney is discharging flue gases at 350^0C, when the ambient temperature is 30^0C. The quantity of air supplied is 18 kg per kg of fuel burnt. Determine (a) draught produced in mm of water, (b) equivalent draught in metres of hot-gas column, (c) efficiency of the chimney, if minimum temperature of artificial draught is 150^0C; the mean specific heat of flue gases is 1.005 kJ/kg-K, (d) the temperature of chimney gases for maximum discharge in a given time and what would be the corresponding draught in mm of water produced   12M

UNIT-III

5. Calculate the critical pressure and throat area per unit mass-flow rate of steam, expanding through a convergent–divergent nozzle from 10 bar, dry saturated, down to atmospheric pressure of 1 bar. Assume that the inlet velocity is negligible and that the expansion is isentropic   12M

(OR)

6. a) Describe the functions of steam condenser   6M
   b) A surface condenser is designed to handle 12000 kg of steam per hour. The steam enters at 8 kPa, 0.9 dry. The condensate leaves the condenser at the corresponding saturation temperature. Calculate the rate of cooling water, if cooling water temperature rise is limited to 12^0C 6M

UNIT-IV

7. a) Give the detailed classification of steam turbines   4M
   b) The velocity of steam at the exit of the nozzle of the impulse turbine is 400 m/s. the blades operate close to the maximum efficiency. The nozzle angle is 20^0. Consider equiangular blades and no blade friction calculate the power and diagram efficiency for the flow rate of 0.6 kg/s   8M

(OR)

8. Dry saturated steam at 2.7 bar enters into a Parsons reaction turbine with 90 m/s. The mean blade height is 40 mm and the exit angle of moving blades is 20^0. The axial velocity of steam is $3/4^{th}$ of the blade velocity at the mean radius. Steam is supplied to the stage at the rate of 9000 kg/h. Calculate wheel speed in rpm, Power, diagram efficiency and enthalpy drop of steam in this stage.   12M

UNIT-V

9. a) List out the advantages of gas turbines   4M
   b) A gas turbine unit receives air at 1 bar and 300 Kand compress it adiabatically to 6.2 bar. The compressor efficiency is 88%. The fuel has a heating value of 44186 kJ/kg and the fuel air ratio is 0.017 kJ/kg of air. The turbine internal efficiency is 90%. Calculate the work of turbine and compressor per kg of air compressed and thermal efficiency. For products of combustion c_p = 1.147 kJ/kg K and γ = 1.333   8M

(OR)

10. a) Explain the working of turbojet engine with neat sketch   6M
    b) Derive the expression for the thermal efficiency of turbo jet engine   6M

AR18

CODE: 18ECT312   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, January,2023
CONTROL SYSTEMS
(Electronics and Communication Engineering)

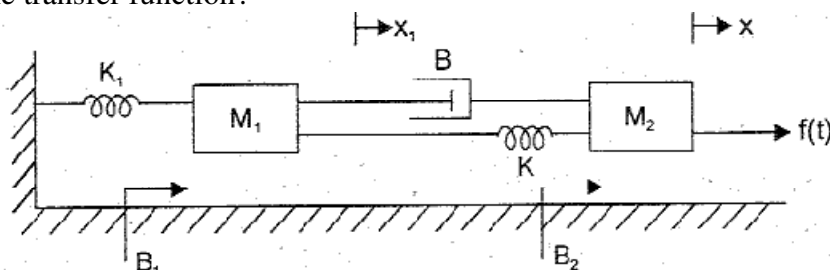Time: 3 Hours   Max Marks: 60

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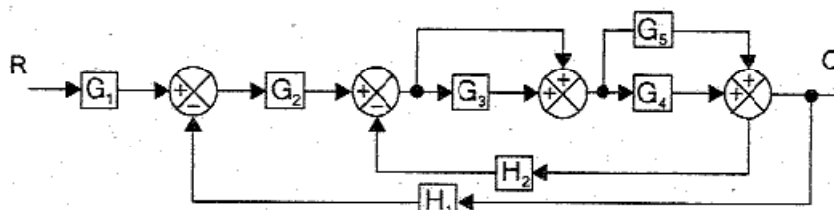All parts of the Question must be answered at one place

UNIT-I

1. a) What is control system? Explain various types of control systems with examples.   6
    b) Write the differential equations governing the mechanical system and determine   6
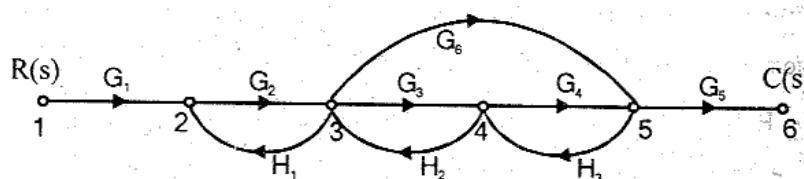   the transfer function?

(OR)

2. a) Consider the block diagram, using block diagram reduction technique find C/R   6

    b) Obtain the Transfer function for the Signal flow graph using Mason's Gain   6
   formula.

UNIT-II

3. a) Derive the transfer function of field flux controlled DC servomotor.   6
    b) A unity feedback system is characterised by the open loop TF   6
        $G(s) = \frac{1}{s(1+0.5s)(1+0.2s)}$. Determine the steady state error for unit-step, unit-ramp and
        unit-parabolic inputs. Further, determine the damping factor and natural frequency
        of the dominant roots.

(OR)

4. a) Why derivative controller is not used in control systems? What is the effect of PI   6
        controller on the system performance?
    b) A positional control system with velocity feedback is shown in fig. What is the   6
        response of the system for unit step input?
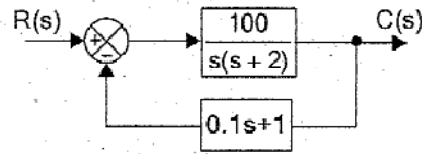
UNIT-III

5. a) According to RH criteria, how can you analyse the stability of the control system?   6
    b) Determine the values of K and b so that the system whose open loop TF is   6
        $G(s) = \frac{K(s+1)}{s^3+bs^2+3s+1}$. Oscillate at a frequency of oscillations 0f 2 rad/sec.

(OR)

6.   Sketch the root locus for $G(s) = \frac{K}{s(s+2)(s+6)}$ 12

UNIT-IV

7. a) Obtain the correlation between the time response and frequency response.   4
    b) Sketch the Bode plot for the following transfer function and determine phase   8
        margin and gain margin $G(s) = \frac{75(1+0.2s)}{s(s^2+16s+100)}$

(OR)

8. a) Define gain margin and phase margin. Explain the significance of these terms to   4
        find the closed loop system stability.
    b) For a feedback control system, sketch the Nyquist plot whose open loop TF is   8
        given as $G(s)H(s) = \frac{40}{(s+4)(s^2+2s+2)}$. Find the gain margin and stability from the
        Nyquist plot.

UNIT-V

9. a) What are the advantages of state model when compared to t.f model?   4
    b) An LTI system is characterised by the homogeneous state equation   8

        $$\dot{x} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} x$$

        Find the time-response of the system. Let us assume the initial state vector as

        $x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

(OR)

10. a) Evaluate the controllability and observability of the following state model   6

        $$A = \begin{bmatrix} -1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix}; B = \begin{bmatrix} 1 & 0 \\ 1 & 2 \\ 2 & 1 \end{bmatrix}; C = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 5 \end{bmatrix}$$

    b) Let the state model of a system be given as   6

        $\dot{x} = \begin{bmatrix} 0 & 1 \\ -12 & -7 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$; $y = [-10 \quad -4]x + u$

        Under zero initial conditions, determine the
        (i)   Transfer function of the system
        (ii)   State transition matrix.

AR18

CODE: 18CST312   SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, January,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) Discuss the tic-tac-toe problem in detail and explain how it can be solved using AI techniques   6
   b) Compare and contrast DFS and BFS and also analyze in terms of time, space, optimality and completeness.   6

(OR)

2. a) What is the scope AI. & list out various problem solving approaches in AI .   6
   b) A problem-solving search can precede either forward or backward. Discuss the factors that determine the choice of direction for a particular problem?   6

UNIT-II

3. a) Explain with algorithm and example   6
      i) Minimax algorithm   ii) Alpha-Beta Pruning
      ii) 8-Queens problem.
   b) Differentiate between Unification and Resolution with suitable examples.   6

(OR)

4. a) Explain in detail about the constraint satisfaction procedure with map colouring example?   6
   b) Explain the syntax and semantics of propositional logic.   6

UNIT-III

5. a) Suggest a semantic net to describe the main organs of the human body.   6
   b) Develop a complete frame based system for hospital application.   6

(OR)

6. a) Differentiate between Forward Vs Backward reasoning.   6
   b) Explain in brief about the issues in representation of knowledge?   6

UNIT-IV

7. a) Differentiate between Supervised and Unsupervised Learning?   6
   b) What is called concept learning and discuss about concept learning as a search.   6

(OR)

8. a) What is machine learning? Explain about inductive and deductive learning.   6
   b) Define and explain S algorithm hypothesis.   6

UNIT-V

9. a) Explain in brief about Decision trees in learning?   6
   b) How inductive bias in developed in machine learning algorithms.   6

(OR)

10. a) What is a decision tree and how it is useful for classification purpose explain with suitable example.   6
    b) Differentiate between Bayes Theorem, and Naïve Bayes classifier.   6

AR16

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)	Develop a relationship between void ratio, water content, degree of Saturation and specific gravity of soil solids.	7M
	b)	Explain formation of soil and different types.	7M

(OR)

2.	a)	Explain in detail I.S. classification of soils.	8M
	b)	Using Stokes law, determine the time of settlement of a sand particle of size 0.20 mm, specific gravity=2.70 , through a depth of water 40 cm. The viscosity of water is 0.001 N-s/m^2 and unit weight is 9.80 kN/m^3.	6M

UNIT-II

3.	a)	Derive the equation to find coefficient of permeability using variable head method.	7M
	b)	Discuss the factors affecting permeability of soil in detail.	7M

(OR)

4.	a)	A permeameter of diameter 82.5 mm contains a column of fine sand 460 mm long. When the water flows through it under a constant head at a rate of 191 ml/min, the loss of the head between two pints 250mm apart is 380mm, calculate the coefficient of permeability in m/s. If falling head test is conducted on the same sample using a stand pipe of diameter 30mm, in what time (min) will the water level in the stand pipe fall from 1560mm to 1066 mm above outflow level.	8M
	b)	Write a note on flow net and quick sand condition.	6M

UNIT-III

5.	a)	A concentrated load of 2000kN is applied at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6m but at a horizontal distance of 5m from the axis of the load. Use Westergaard's equation.	6M
	b)	Discuss Newmark's influence chart and its uses.	8M

(OR)

6.	a)	Explain vertical stresses due to concentrated load.(Boussinesq theory)	8M
	b)	A concentrated load of 22.5 KN acts on the surface of a homogeneous soil mass of large extent. Find the stress intensity at a depth of 15m (i) directly under the load (ii) at a horizontal distance of 7.5m. Use Boussinesq's equation.	6M

UNIT-IV

7. a) Explain the spring analogy for primary consolidation ?   7M
   b) Determine the amount of settlement with the following data. Thickness of   7M
      compressible medium=3.00m, Coefficient of volume decrease=0.003cm^2/N,
      pressure increment at the centre of compressible medium=70 kN/m^2.

(OR)

8. a) Write the assumptions of terzaghi's of 1d consolidation theory.   6M
   b) Write the difference between compaction and consolidation.   8M

UNIT-V

9. a) Describe the Direct shear test in detail   8M
   b) Two identical specimens of a soil were tested in a triaxial apparatus. First   6M
      specimen failed at a deviator stress of 770 kN/m^2, when the cell pressure was 200
      kN/m^2, while the second specimen failed at a deviator stress of 1370 kN/m^2
      under a cell pressure of 400 kN/m^2. Determine c and φ.

(OR)

10. a) Discuss different types of laboratory tests to determine shear strength of a soil.   8M
    b) In an in-situ Vane shear test on a saturated clay , a torque of 35Nm was required   6M
       to shear the soil. The diameter of the vane was 50mm and length 100mm.
       Calculate the undrained shear strength of the clay. The vane was then rotated
       rapidly to cause remoulding of the soil. The torque required to shear the soil in
       the remoulded state was 5 Nm. Determine the sensitivity of the clay.

AR16

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, January,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) With the help of a block diagram, show the three stages of Generalized Measurement System. Also explain the functions of each stage. — 7M
   b) Explain Linear Variable Differential Transformer with a neat sketch for the measurement of linear displacements. — 7M

(OR)

2. a) Sketch and explain variable capacitive transducer elements with applications. — 7M
   b) Explain the construction, principle of working and advantages of Variable resistance vibration sensor. — 7M

UNIT-II

3. a) Explain the construction and working of strain gauge load cell for the measurement of force. — 7M
   b) What are the different instruments that are used to measure torque? Explain anyone with neat sketches — 7M

(OR)

4. a) Derive, from first principles, the relationship for gauge factor of a strain gauge. — 7M
   b) Explain principle and operation of stroboscope for speed measurement? — 7M

UNIT-III

5. a) Describe with a neat sketch the principle of working of bourdon tube pressure gauge and also mention its advantages and disadvantages. — 7M
   b) Discuss the construction and working of thermocouple type thermal conductivity gauge for low pressure measurement. — 7M

(OR)

6. a) Explain the disappearing filament pyrometer setup and explain its operation. — 7M
   b) How to measure the level using anyone of the transducer? — 7M

UNIT-IV

7. Explain the construction, working and applications of the following types of flow Meters: (a) Ultrasonic flow meter (b) Hot wire annumo flow meter. — 14M

(OR)

8. a) Explain the measurement of humidity using Recording Type Psychrometer — 7M
   b) Draw and explain Dew point meter for Measurement of moisture? — 7M

UNIT-V

9. a) Describe with neat sketch the open loop speed control system. — 8M
   b) State Functions of P+I+D controller — 6M

(OR)

10. a) Discuss advantages and disadvantages of open loop and closed control systems? — 6M
    b) Explain P+I control algorithm and write their advantages and disadvantages? — 8M

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