AR20

CODE: 20IET211 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech. II Semester Regular/Supplementary Examinations, May, 2023

TRANSFORM THEORY

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)	Evaluate $L[e^{3t} + 4t^2 - 3sin3t + 6cos3t]$	5M	CO1	K3
	(b)	Evaluate $L[sin4tcos2t]$	5M	CO1	K3
		(OR)			
2.	(a)	Evaluate $L[tsin2tcos3t]$	5M	CO1	K3
	(b)	Evaluate $L\left[\frac{sin2tcos3t}{t}\right]$	5M	CO1	K3
		UNIT-II			
3.	(a)	Evaluate $L^{-1}\left[\frac{s^2}{(s-1)(s-2)(s-3)}\right]$	5M	CO2	K3
	(b)	Evaluate $L^{-1}\left[\frac{s^2}{(s^2+9)(s^2+25)}\right]$	5M	CO2	K3
		(OR)			
4.		Using Laplace transform method, Solve the following differential equation $y'' - 4y' - 12y = e^{3t}$ given $y(0) = 1$ & $y'(0) = -2$.	10M	CO2	K3
		UNIT-III			
5.		Using Fourier Integral Show that $e^{-ax} - e^{-bx} = \frac{2(b^2 - a^2)}{\pi}\int_0^\infty \frac{\lambda Sin(\lambda x)}{(\lambda^2 + a^2)(\lambda^2 + b^2)} d\lambda \ , \quad a, b > 0$	10M	CO3	K3
		(OR)			
6.		Find the Fourier transform of $f(x) = \begin{cases} 1, if & -a < x < a \\ 0, if & x > a \ or \ x < -a \end{cases}$ and hence evaluate $\int_0^\infty \frac{sinp}{p} dp$	10M	CO3	K3
		UNIT-IV			
7.		Find the Fourier sine transform of $\frac{e^{-ax}}{x}, a > 0$ and hence deduce the integrals $\int_0^\infty \frac{e^{-ax} - e^{-bx}}{x} sinpx \ dp$ using inversion formula.	10M	CO4	K3
		(OR)			
8.		Find the inverse Fourier Sine transform of $\frac{p}{1+p^2}$	10M	CO4	K2
		UNIT-V			
9.	(a)	Evaluate $Z[(n-1)^2]$	5M	CO5	K2
	(b)	Evaluate $Z[e^{-an}cosn\theta]$	5M	CO5	K2
		(OR)			
10.		Evaluate $Z[2(3)^n + 5n]$ and hence deduce the values of $Z[2(3)^{n+3} + 5(n+3)]$ using Shifting theorem.	10M	CO5	K3
		UNIT-VI			
11.	(a)	Evaluate $Z^{-1}\left[\frac{z^2}{(z-4)(z-5)}\right]$ by using Convolution theorem.	5M	CO5	K3
	(b)	Evaluate $Z^{-1}\left[\frac{2z^2+3z}{(z+2)(z-4)}\right]$	5M	CO5	K2
		(OR)			
12.		Solve the difference equation $y_{n+2} - 5y_{n+1} + 6y_n = 5^n$, given that $y_0 = 0$ & $y_1 = 0$ by using Z-transforms	10M	CO6	K3

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CODE: 20IET212 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Regular Examinations, May, 2023

NUMERICAL METHODS

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.	Apply Newton-Raphson method , to find the positive root of $f(x)=e^x-3x=0$	10	1	K2
	(OR)			
2.	Find the positive root of the equation $f(x)=x^3-5x+1=0$, using Bisection method	10	1	K2
	UNIT-II			
3.	Using Newton's for ward Interpolation Formula, calculate the Interpolating polynomial y(x) from the table & also find y(0.5) & y(1.5)	10	2	K2

x	0	1	2	3
y(x)	1	3	7	13

(OR)

		Marks	CO	Blooms Level
4.	Using Lagrange's formula ,calculate f(3) from the following table	10	2	K2

X	0	1	2	4	5	6
f(x	1	14	15	5	6	19

UNIT-III

		Marks	CO	Blooms Level
5.	Find the first & second derivatives of the function at the point x=3 , by using Newton's backward Interpolation Formula	10	3	K3

X	1.5	2	2.5	3	3.5	4
f(x)	3.375	7.0	13.625	24.0	38.875	59.0

(OR)

		Marks	CO	Blooms Level
6.	Compute the first & second derivatives at x=3 from the following table , by using Lagrange's formula	10	3	K3

x	1	2	4	8	10
y(x)	0	1	5	21	27

UNIT-IV

		Marks	CO	Blooms Level
7.	Evaluate the following integral , $\int_1^2 \frac{e^x}{x}dx$ by using Simpson's 1/3 rule and Simpson's 3/8 rule.	10	4	K3
	(OR)			
8.	By using Trapezoidal rule , Simpson's 1/3 rule and Simpson's 3/8 rule , to evaluate the integral $\int_1^2 \frac{1}{x}dx$	10	4	K3
	UNIT-V			
9.	Using Taylor's series method to obtain the values of y(1.1) &y(1.2) & y(1.3) for the differential equation $\frac{dy}{dx}=(xy^{\frac{1}{3}})$ with y(1)=1 & h=0.1	10	5	K3
	(OR)			
10.	Apply the fourth order Runge-Kutta method, to find an approximate value of y , when x=0.1 , 0.2 & 0.3 . Given that $\frac{dy}{dx}=xy+y^2$, $y(0)$=1 &h=0.1	10	5	K3
	UNIT-VI			
11.	Fit a second degree polynomial $y=a+bx+cx^2$ to the following data by the method of least squares.	10	6	K3

X	2	4	6	8	10
Y	3.07	12.85	31.47	57.38	91.29

(OR)

		Marks	CO	Blooms Level
12.	By the method of least squares , fit an exponential curve $y = a e^{bx}$	10	6	K3

X	0	1	2	3	4	5	6	7	8
Y	20	30	52	77	135	211	326	550	1052

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CODE: 20IET213 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular/Supplementary Examinations, May, 2023

INTRODUCTION TO NUMBER THEORY

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.	Determine g.c.d of 595 and 252, and express the linear combination of 595 and 252	10	CO1	L3
	(OR)			
2.	Prove that $9^n - 8^n - 1$ is divisible by 8	10	CO1	L3
	UNIT-II			
3.	Find the reminder in the division of 3^{40} by 23	10	CO2	L3
	(OR)			
4.	Solve the congruence $259x \equiv 5 \ (Mod\ 11)$	10	CO2	L3
	UNIT-III			
5.	Define Euler-Fermate theorm and Show that $n^5 - n$ is divisible by 30	10	CO3	L3
	(OR)			
6.	Find all integers that leaves the reminders 1or 2 when they divided by each of 3,4&5.	10	CO3	L3
	UNIT-IV			
7.	Determine the number of divisors and sum divisors of 9504	10	CO4	L3
	(OR)			
8.	Define Mobius function . Determine $\mu(11), \mu(15)$, $\mu(17), \mu(20)$	10	CO4	L3
	UNIT-V			
9.	Difine order of integer and primitive root. hence find order of 3(mod7) and primitive root of 6.	10	CO5	L3
	(OR)			
10.	Determine whether 888 is quadratic residue of 1999 or not	10	CO5	L3
	UNIT-VI			
11.	Using Caesar cipher method , To encrypt the message " THIS MESSAGE IS TOP SECRET " by using transformation $C \equiv P + 3(mod 26)$	10	CO6	L3
	(OR)			
12.	To decrypt the cipher text message "FEXENZMBMKJNHMGMYZMN" using the transformation $C \equiv 7P + 10(mod 26)$	10	CO6	L3

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CODE: 20IET215 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Regular/Supplementary Examinations, May, 2023

Remote Sensing

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.	Explain the electromagnetic energy and illustrate the two models used to describe the electromagnetic energy with a neat sketch?	10	1	Understanding
	(OR)			
2.	List and describe the stages of remote sensing with a neat sketch?	10	1	Remembering & Understanding
	UNIT-II			
3.	Distinguish ground borne, airborne and space borne platforms with figures?	10	2	Analysing
	(OR)			
4.	Illustrate the types of remote sensing satellite/ orbits with figures.	10	2	Understanding
	UNIT-III			
5.	Define passive sensors and explain any four types of passive sensors?	10	3	Remembering & Understanding
	(OR)			
6.	Explain the term resolution and its types?	10	3	Understanding
	UNIT-IV			
7.	Explain the different elements of visual image interpretation?	10	4	Understanding
	(OR)			
8.	Define the term image enhancement and explain the non-linear contrast enhancement with a neat sketch?	10	4	Remembering & Understanding
	UNIT-V			
9.	Explain the various processes involved in image classification with flow chart?	10	5	Understanding
	(OR)			
10.	Explain about the supervised classification with flow chart?	10	5	Understanding
	UNIT-VI			
11.	Explain the application of remote sensing in Forest studies?	10	6	Understanding
	(OR)			
12.	Explain the application of remote sensing in Agricultural studies?	10	6	Understanding

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CODE: 20IET218 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Regular / Supplementary Examinations, May, 2023

Introduction to Electronic Measurements

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 types of static errors that could occur in measurements.	6M	CO1	Understanding
	b	The expected value of the voltage across a resistor is 80V. However, the measurement gives a value of 79V. Calculate (i) Absolute Error and (ii) percentage accuracy	4M		Applying
		(OR)			
2.	a	List and explain the dynamic characteristics	6M	CO1	Understanding
	b	What are the sources of errors?	4M		
		UNIT-II			
3.	a	Explain the principle of DC ammeter with necessary diagram	6M	CO2	Understanding
	b	A 1mA meter movement with an internal resistance of 100 Ω is to be converted into a 0 – 100 mA. Calculate the value of shunt resistance required?	4M		Applying
		(OR)			
4.	a	What are the general requirements of a shunt resistor used in DC ammeters?	5M	CO2	Understanding
	b	Explain the shunt type of ohmmeter and its calibration	5M		
		UNIT-III			
5.		Describe the function generator with necessary block diagram	10M	CO3	Understanding
		(OR)			
6.		Explain harmonic distortion analyzer using(i) Resonance Bridge and (ii) Bridged T-Network	10M	CO3	Understanding
		UNIT-IV			
7.		Draw the block diagram of CRO and explain in detail.	10M	CO4	Understanding
		(OR)			
8.		Mention the specifications and applications of CRO	10M	CO4	Understanding
		UNIT-V	Marks	CO	Blooms Level
9.	a	Explain Maxwell's bridge with necessary circuit diagram.	6M	CO5	Understanding
	b	List DC and AC bridges used in measurement.	4M		Remembering
		(OR)			
10.		Describe about Schering's Bridge for measurement of capacitance	10M	CO5	Understanding
		UNIT-VI			
11.	a	What is a transducer? Explain its classification	5M	CO6	Understanding
	b	Explain about potentiometer. What are its advantages and disadvantages?	5M		
		(OR)			
12.		Describe about thermistors in detail	10M	CO6	Understanding

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CODE: 20IET21A SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

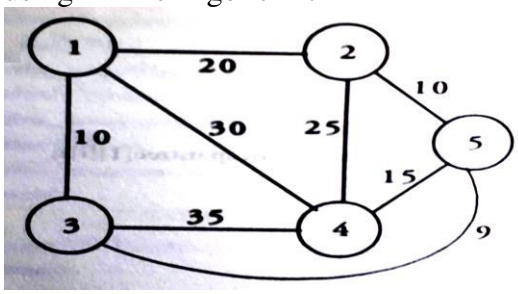
II B.Tech.II Semester Regular/Supplementary Examinations, May, 2023

Fundamental of Data Structures

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 a Data Structure. Explain the operations of Data Structure.	5M	CO1	K2
	b)	Define a Time complexity and Space complexity.	5M	CO1	K2
		(OR)			
2.		Explain the Asymptotic Notations(O, Ω, Θ).Find the time complexity of Linear search.	10M	CO1	K2
		UNIT-II			
3.	a)	Write a Linear Search Algorithm with example.	5M	CO2	K2
	b)	Write a Bubble sort Algorithm.	5M	CO2	K2
		(OR)			
4.		Explain selection sort. Write selection sort algorithm and time complexity of Selection sort.	10M	CO2	K3
		UNIT-III			
5.	a)	Definition of a Stack. Write an Application of Stack.	5M	CO3	K2
	b)	Define a Queue. Explain the operations of Queue.	5M	CO3	K2
		(OR)			
6.		Write an Algorithm for conversion of Infix to postfix expression with example.	10M	CO3	K3
		UNIT-IV			
7.	a)	Comparison between Arrays and Linked list	5M	CO4	K2
	b)	Write an Algorithm to insert a node to the beginning of a singly linked list?	5M	CO4	K2
		(OR)			
8.		Demonstrate the following Deletion operations on single linked list with example . a) At the beginning of the list b) at the end of the list c) at any given position	10M	CO4	K2
		UNIT-V			
9.	a)	Explain the various binary tree representations with example.	5M	CO5	K2
	b)	Explain the different Binary Tree Traversal Techniques.	5M	CO5	K2
		(OR)			
10.		Define a Binary search tree. Construct the Binary Search Tree in step by step for the below given list {10, 14, 16, 8,17, 6, 23, 60 , 5 , 18, 27, 36, 12, 87, 65 , 50}.	10M	CO5	K3
		UNIT-VI			
11.	a)	Define a Graph. Explain the representation of Graph.	5M	CO6	K2
	b)	Construct a minimum cost spanning tree for given weighted graph using Prim's Algorithm.	5M	CO6	K3



(OR)

12.		Write a Graph Traversal Algorithms (DFS,BFS) with example.	10M	CO6	K2

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CODE: 20IET21B **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Regular/Supplementary Examinations, May,2023

Advanced Coding-I

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 pointers to function with example.	5	1	L2
	b	Implement the C++ code for the following problem.	5	1	L3

2-sum problem:

Given an array of integers nums and an integer target, return indices of the two numbers such that they add up to target.

You may assume that each input would have exactly one solution, and you may not use the same element twice.

You can return the answer in any order.

Example:

Input: nums = [2,7,11,15], target = 9

Output: [0,1]

Because nums[0] + nums[1] == 9, we return [0, 1].

(OR)

2.	a	Explain about new and delete operators in C++ with example.	5	1	L2
	b	Build a C++ code for the following problem	5	1	L3

Fruit Into Baskets

You are visiting a farm that has a single row of fruit trees arranged from left to right. The trees are represented by an integer array fruits where fruits[i] is the type of fruit the ith tree produces. You want to collect as much fruit as possible. However, the owner has some strict rules that you must follow:

- You only have two baskets, and each basket can only hold a single type of fruit. There is no limit on the amount of fruit each basket can hold.
- Starting from any tree of your choice, you must pick exactly one fruit from every tree (including the start tree) while moving to the right. The picked fruits must fit in one of your baskets.
- Once you reach a tree with fruit that cannot fit in your baskets, you must stop.

Given the integer array fruits, return the maximum number of fruits you can pick.

Example:

Input: fruits = [1,2,3,2,2], **Output**: 4

Explanation: We can pick from trees [2,3,2,2].

If we had started at the first tree, we would only pick from trees [1,2]

		UNIT-II			
3.		Demonstrate Inheritance in C++.	10	2	L2
		(OR)			
4.		Discuss exception handling in C++.	10	2	L6

UNIT-III

5.	a	Explain Characteristics of an algorithm.	5	3	L5
	b	Find the time complexity for the recursive function given below.	5	3	L3

```
void test(int n)
{
    if(n>1){
        test(n/2);
        for(i=0; i<n; i++)
          cout << i;
     }
}
```

(OR)

6.	a	How can we measure the efficiency of an algorithm. Explain.	5	3	L1
	b	Find the time complexity for the recursive function given below.	5	3	L3

```
void test(int n)
{
    if(n>0){
        test(n-1);
        for(i=1; i<n; i=i+1)
          cout << i;
     }
}
```

UNIT-IV

7.		Discuss about stack and queue STL containers in C++ and their functions with examples.	10	4	L6

(OR)

8.		Discuss about Set STL container, types of sets and their functions with example.	10	4	L6

UNIT-V

9.		Discuss Recursion. Write a C++ solution to generate all permutations of characters in a given string.	10	5	L2,L3

(OR)

10.		Explain about Backtracking. Discuss N-queen problem and give a C++ solution for it.	10	5	L2,L3

UNIT-VI

11.	a	Demonstrate Extended Euclidean algorithm	5	6	L2
	b	Write a C++ solution for Factorial Trailing Zeroes. **Statement:** Given an integer n, return the number of trailing zeroes in n!. **Input**: n = 5, **Output**: 1 Explanation: 5! = 120, one trailing zero.	5	6	L3

(OR)

12.	a	Demonstrate the approach of Sieve of Eratosthenes.	5	6	L2
	b	Write a C++ solution to Check If It Is a Good Array. **Statement:** Given an array nums of positive integers. Your task is to select some subset of nums, multiply each element by an integer and add all these numbers. The array is said to be good if you can obtain a sum of 1 from the array by any possible subset and multiplicand. Return True if the array is good otherwise return False. **Input**: nums = [12,5,7,23], **Output**: true **Explanation**: Pick numbers 5 and 7. 5*3 + 7*(-2) = 1	5	6	L3

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CODE: 20IET21C **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech.II Semester Regular/Supplementary Examinations, May, 2023

Competative Programming – I

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.	Define an Operator and Explain operators in CPP.	10	1	L1
	(OR)			
2.	What are input and output statements in CPP. Explain built functions.	10	1	L2
	UNIT-II			
3.	Explain OOP principles in detail.	10	2	L3
	(OR)			
4.	What are the keywords in Exception Handling? Explain.	10	2	L2
	UNIT-III			
5.	Define space complexity. Explain with an example program.	10	3	L1
	(OR)			
6.	Explain Big-oh, Omega, Theta notations clearly with example program.	10	3	L3
	UNIT-IV			
7.	Define stack? Explain all operations for stack with example program.	10	4	L2
	(OR)			
8.	What is priority queue? Describe in detail.	10	4	L1
	UNIT-V			
9.	What are the different types of operators in SQL. Explain with queries.	10	5	L1
	(OR)			
10.	Write queries using order by and group by. Explain in detail.	10	5	L2
	UNIT-VI			
11.	What are 8i joins? Explain with suitable queries.	10	6	L2
	(OR)			
12.	What is the difference between a sub query and a correlated sub query? Explain with suitable queries.	10	6	L4

AR18

CODE: 18CST208 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B. TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY, 2023
DESIGN & ANALYSIS OF ALGORITHMS
(COMMON TO CSE AND 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 pseudo-code conventions	6M
	b)	Explain about algorithm with suitable example	6M
		(OR)	
2.	a)	Elaborate asymptotic analysis of an algorithm	6M
	b)	Discuss amortized analysis.	6M

UNIT -II

3.	a)	Explain merge sort with suitable example.	6M
	b)	Trace the binary search algorithm with suitable example.	6M
		(OR)	
4.	a)	Find a job sequencing solution for the instance n=7, (p1, p2,…., p7)=(3, 5, 20, 18, 1, 6, 30) and (d1, d2, …., d7)=(1, 3, 4, 3, 2, 1, 2).	6M
	b)	Difference between prims and kruskal algorithm	6M

UNIT -III

5.	a)	What is travelling sales person problem and what are its applications?	6M
	b)	Find the shortest tour of a tsp for following instance using dynamic programming.	6M

	a	b	c	d
A	0	10	15	20
B	5	0	9	10
C	6	13	0	12
D	8	8	9	0

(OR)

6.	a)	Write an algorithm for 0/1 knapsack problem using dynamic programming.	6M
	b)	Solve the following instance of 0/1 knapsack problem using dynamic programming n = 3; (w1, w2, w3) = (3, 5, 7); (p1, p2, p3) = (3, 7, 12); m = 4.	6M

UNIT -IV

7.	a)	Compare DFS & BFS	6M
	b)	Differentiate connected components, & bi-connected components.	6M
		(OR)	
8.	a)	Discuss n-queens problem	6M
	b)	Apply backtracking to solve the following instance of the subset sum problem S= {1, 3, 4, 5} and d=8	6M

UNIT -V

9.	a)	Plan the following instance of the knapsack problem by the LC branch and bound and FIFO branch and bound algorithms. N = 4; p = {1,2,5,6}; w = {2,3,4,5}; m=8	12M
		(OR)	
10.	a)	Explain cook's theorem	6M
	b)	Differentiate np hard and np complete problems	6M

AR18

CODE: 18MET207 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech II Semester Supplementary Examinations, May, 2023

INSTRUMENTATION AND CONTROL

(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 about dynamic characteristics of an instrument.	6M
	b)	With the help of neat sketch explain how vibrometer is used for measuring acceleration?	6M
		(OR)	
2.	a)	Discuss briefly different types of error, its sources and their elimination methods	6M
	b)	Explain the principle and working of seismic type accelerometer	6M

UNIT-II

3.	a)	With the help of neat sketch, explain the principle of torsion meter for torque measurement?	6M
	b)	Derive an expression for gauge factor of a resistance strain gauge.	6M
		(OR)	
4.	a)	Explain the working principle of a load cell for force measurement.	6M
	b)	Enumerate the working principle of stroboscope for speed measurement.	6M

UNIT-III

5.	a)	Discuss the working principle of Mc Leod guage for pressure measurement.	6M
	b)	What is a thermistor? How is it used for temperature measurement	6M
		(OR)	
6.	a)	With the help of a neat sketch, describe the working of a total radiation pyrometer.	6M
	b)	Explain the working principle of Ionization type pressure gauges.	6M

UNIT-IV

7.	a)	Explain with a neat sketch how a dew point meter works.	6M
	b)	Explain with a neat sketch of Hot-wire anemometer for flow measurement.	6M
		(OR)	
8.	a)	With a sketch, explain the working of a Absorption Hygrometer.	6M
	b)	Describe the working of a turbine flow meter.	6M

UNIT-V

9.	a)	Find the stability of system $x=s5+2s4+6s^3+2s^2+2s+8$.	6M
	b)	Explain open loop and closed loop controller system with examples.	6M
		(OR)	
10.	a)	Explain PI control algorithm and write their advantages and disadvantages?	6M
	b)	Find the stability of system $x=s^4+3s^3+4s^2+2s+10$	6M

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AR18

CODE: 18CET208 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech II Semester Supplementary Examinations, May,2023

Mechanics of Solids-II

(CIVIL ENGINEERING)

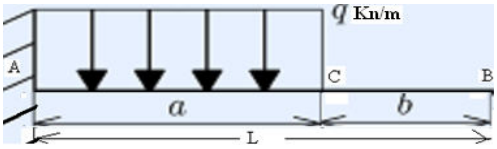
Time: 3 Hours **Max Marks: 60**

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

UNIT-I

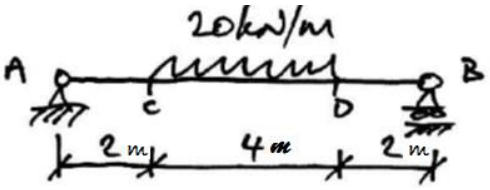
1. a) A cantilever of length L carries a point load W at its free end (B). The member is circular in cross section having a diameter D for a distance L/2 from the fixed end A and a diameter D/2 for the remaining length. Find the slope at junction (C) and free end B. 6 M

b) The determine the deflection at the point B in a cantilever beam of length 'L' loaded as shown in figure? 6 M



(OR)

2. A simply supported beam is loaded as shown in the figure. Use Mecaulays method and determine the rotation at the support 'A' and also at the points C and D. Take EI = 108 $\times 10^3$ kN-m^2. Also find maximum deflection in the beam AB shown above. 12M



UNIT-II

3. a) A thin cylindrical shell of 0.5 m internal diameter and 1.0 m long is subjected to an internal pressure 1.3 N/mm^2. Thickness of cylinder wall is 16 mm. Determine (i) longitudinal stress, circumferential stress and maximum shear stress induced. 6 M

b) Derive an expression for the longitudinal, hoop and volumetric strain in thin cylinders. 6 M

(OR)

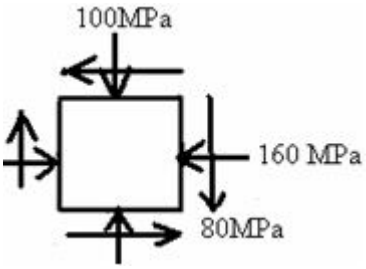
4. a) Differentiate between thin and thick cylinders? 4 M

b) A thick cylinder of steel having an internal diameter of 100 mm and external diameter of 200 mm is subjected to an internal pressure of 80 N/mm^2. Find the maximum stress induced in the material and the change in the external diameter. Take Young's Modulus $E = 2 \times 10^5$ N/mm^2 and Poisson's ratio = 0.3. 8 M

UNIT-III

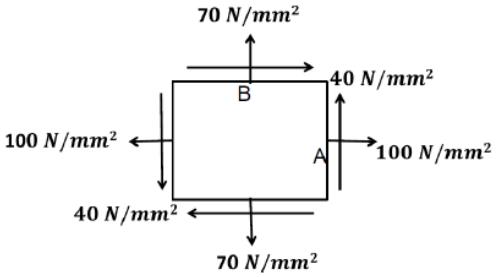
5. a) The stresses on two perpendicular planes through a point in a body are 30 MPa and 15 MPa both tensile along with a shear stress of 25MPa. Determine the following by any one approach. (i) The magnitude and direction of principal stresses. (ii) The planes of maximum shear stress and the respective planes. 7 M

   b) The stresses on two perpendicular planes through a point in a body are 160 MPa and 100MPa both compressive along with a shear stress of 80MPa as shown in the figure. Determine i)The normal and shear stresses on a plane inclined at 30^0 to the plane on which 160MPa Stress is acting. ii) Sketch the results of stresses on an element within body. 5 M



(OR)

6. a) An element in a strained body is as shown below. (i) Find the major and minor principal stresses and its corresponding principal planes. (ii)Find the maximum shear stress and its corresponding planes. Solve by analytical method. 7 M



   b) For the stress system shown in Fig.1 Find the normal and tangential stresses on an inclined plane at 60° to the vertical plane. Solve by analytical method. 5 M

UNIT-IV

7. a) What is the limiting slenderness ratio value for a long steel column with yield stress of 250 MPa. 4 M

   b) Derive Euler's theory for long column when one end is fixed and other end is hinged. Mention the assumptions made in Euler's theory. 8 M

(OR)

8. a) Differentiate between Euler's theory and Rankine Theory. 4 M

   b) A hollow cylindrical cast iron column is 4 m long, both ends fixed. Design the column to carry an axial load of 250 kN. Use Rankin's formula and adopt a factor of safety of 5. The internal diameter may be taken as 0.8 times external diameter. Take f_c = 550 N/mm^2. Rankin's constant (a) =1/1600. 8 M

UNIT-V

9. a) Sketch the profiles of core/ kernel for the following cross sections. i) Rectangular ii) Circular 4 M

   b) A square chimney 30 m high has a flue opening of size 1.5 m x1.5 m. Find the minimum width requires at the base for no tension, if the masonry weighs 20 kN/m^3 and the wind pressure is 1.5 kN/m^2. The permissible stress in masonry is 1 N/mm^2. 8 M

(OR)

10. A masonry dam, trapezoidal in cross section 4 m high, 1 m wide at its top and 3 m wide at its bottom, retains water on its vertical face to a maximum height of 3.5 m from its base. Determine the maximum and minimum stress at the base when the reservoir is full. Take unit weight of masonry as 19.62 kN/m^3. 12M

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AR16

CODE: 16CE2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, May,2023

Hydraulics and Hydraulic Machinery

(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) Describe the Buckingham's method of dimensional analysis. **6M**

   b) Assuming that the rate of flow Q of a centrifugal pump is dependent upon the mass density ρ of fluid, pump speed N in rpm, the diameter of impeller D, the pressure p and viscosity of fluid μ, show that $\frac{Q}{ND^3} = \emptyset\left[\left(\frac{P}{\rho N^2 D^2}\right)\left(\frac{\mu}{\rho N D^2}\right)\right]$ **8M**

(OR)

2. a) Discuss Rayleigh's method of dimensional analysis. **6M**

   b) show that the velocity through a circular orifice is given by $V=\sqrt{2gH}\ \ f\left\{\frac{D}{H}, \frac{\mu}{\rho VH}\right\}$ where H is the head causing the flow, D is the diameter of the orifice, μ is the viscosity, ρ is the mass density and g is acceleration due to gravity. **8M**

UNIT-II

3. a) Derive the condition for most economical trapezoidal section of an open channel. **6M**

   b) Find the possible maximum discharge in a rectangular channel of width 3 m for a specific energy of 2.5 m. **8M**

(OR)

4. a) Derive the expression for head loss due to hydraulic jump in a rectangular channel of horizontal slope. **6M**

   b) A rectangular channel is 20 m wide and carries a discharge of 65 m^3/s. It is laid at a slope of 0.0001. At a certain section along the channel length, the depth of flow is 2 m. Name the water surface profile. How far upstream/downstream will the depth be 2.6 m ? Take Manning's n as 0.02. **8M**

UNIT-III

5. a) Obtain an expression for the work done per second by runner on a series of radial curved vanes fixed to a wheel, while the jet is entering at one tip and leaving at other tip. **6M**

   b) A jet of water having a velocity of 30 m/s strikes a curved vane, which is moving with a velocity of 15 m/s. The jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at an angle of 120° to the direction of motion of vane at outlet. Calculate i) vane angles, if the water enters and leaves the vane without shock, ii) work done per second per unit weight of water striking the vanes per second. **8M**

(OR)

6. a) Find an expression for the efficiency of a series of moving flat plates when a jet of water strikes the vanes at one of its tips. Prove that maximum efficiency is 50 %. **6M**

b) A jet of water of the diameter 100 mm strikes a curved plate at its centre with a velocity of 15 m/s. The curved plate is moving with a velocity of 7 m/s in the direction of the jet. The jet is deflected through an angle of 150°. Assume the plate is smooth find i) force exerted on the plate in the direction of the jet, ii) power of the jet, and iii) efficiency. **8M**

UNIT-IV

7. a) A pelton wheel has a mean bucket speed of 35 m/s with a jet of water flown at the rate of 1 m^3/s under a head of 270 m. The buckets deflect the jet through an angle of 170°. Calculate the power delivered to the runner and hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. **8M**

b) Describe the components, working principle of Francis turbine with a neat sketch and derive the expression of hydraulic efficiency of Francis turbine. **6M**

(OR)

8. a) What do you mean by gross head, net head of turbine? Explain the different types of the efficiencies of a turbine. **6M**

b) Find the diameter of runner, vane angles of a Francis turbine for the following data. Net head H=68 m. Speed N=750 rpm. Output power P=330kW. Hydraulic efficiency = 94% and overall efficiency = 85%; Flow ratio =0.15; Breadth ratio = 0.1; Inner diameter of the runner = half of the outer diameter. Also assume 6% of the circumferential area of the runner to be occupied by the thickness of the vanes. Velocity of flow remains constant throughout and the flow is radial at exit. **8M**

UNIT-V

9. a) Derive the expression for specific speed of the centrifugal pump. **6M**

b) A three stage centrifugal pump has impeller 40cm in diameter and 2.5 cm wide at outlet. The vanes are curved back at outlet at 30^0 and reduce circumferential area by 15%. The manometric efficiency is 85% and overall efficiency is 75%. Determine the head generated by the pump when running at 1200 rpm and discharge is 0.06 m^3/sec. Find the shaft power also. **8M**

(OR)

10. a) How will you obtain an expression for minimum starting speed of a centrifugal pump? Also draw the operating characteristic curves of the centrifugal pump. **6M**

b) A centrifugal pump has the following characteristics: Outer diameter of the impeller = 800 mm; Width of the impeller vanes at outlet = 100 mm; Vane angle at outlet = 40^0; Speed of the impeller = 550 rpm; Discharge = 0.98 m^3/s; Manometric head = 35 m; A 500 kW motor is used to drive the pump. Determine the manometric, mechanical and overall efficiencies of the pump. Assume water enters the impeller radially at inlet. **8M**

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AR13

CODE: 13EC2008 **SET-I**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH II SEM SUPPLEMENTARY EXAMINATIONS, MAY, 2023
ELECTRONIC CIRCUITS – II
(ELECTRONICS AND COMMUNICATION ENGINEERING)

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

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) What is the significance of Cascading?
   b) What is Darlington pair?
   c) Classify the Amplifiers
   d) What is the impact of negative feedback on noise in circuits?
   e) Define Barkhusan's Criterion.
   f) Define the term unloaded Q factor
   g) Define harmonic Distortions.
   h) Define Thermal stability.
   i) What is the purpose of staggered tuning
   j) Define Line Regulation.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) Compare CE, CC and CB amplifier in terms of voltage gain, current gain, input and output impedances. 8M
   b) How can you choose the transistor configuration in cascade amplifier. 4M

(OR)

3. a) Draw and explain the working of a two stage RC Coupled amplifier. Derive the expression for voltage gain 8M
   b) Distinguish between direct coupling and transformer coupling. 4M

UNIT-II

4. a) What should be the amount of feedback, if the bandwidth is to be restricted to 1 MHz? 4M
   b) Explain how negative feedback acts on bandwidth, distortion, Input Impedance and Output Impedance of a circuit. 8M

(OR)

5. a) Explain Nyquist criterion to analyse the stability of feedback amplifiers. 4M
   b) Explain voltage series and voltage shunt feedback connections 8M

UNIT-III

6. a) Write a note on frequency stability of oscillators. 4M
   b) Draw the circuit diagram of a RC phases shift oscillator using BJT. Derive the expression for frequency of oscillation. 8M

(OR)

7. a) Explain Wien bridge oscillator and derive its frequency of oscillation. 6M
   b) Draw the circuit diagram of a Colpitts oscillator. Derive the expression for frequency of oscillation 6M

UNIT-IV

8. a) Derive the expression for maximum value of conversion efficiency of class A power amplifier. 6M
   b) What is the significance of Complementary Symmetry push pull amplifier? Explain with neat sketch. 6M

(OR)

9. a) Derive the expression for maximum value of conversion efficiency of class B power amplifier. 6M
   b) Explain about class D and class S power amplifiers. Mention their salient features and applications 6M

UNIT-V

10. a) In a single tuned amplifier, the circuit bandwidth is 5KHz, and the voltage gain has maximum at 1000KHz, when the tuning capacitor is adjusted to 500pF. Calculate the Q of the circuit and the coil inductance. 4M
    b) Define the terms (i) Load Regulation (ii) Line Regulation (iii) Ripple Rejection and (iv) Temperature Stability pertaining to voltage regulator ICs. 8M

(OR)

11. a) Draw the equivalent circuit of a capacitance coupled single tuned amplifier and derive the equation for voltage gain 8M
    b) Give the disadvantages of the series and shunt regulators? 4M

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