AR20

CODE: 20CET202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular/Supplementary Examinations, December-2022

CONSTRUCTION MATERIALS AND CONCRETE TECHNOLOGY

(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

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Briefly explain about classification of stones.	5 M	1	Understand
	b)	Write any five characteristics of good brick.	5 M	1	Remember
		(OR)			
2.	a)	Draw the cross section of a tree and explain the structure of timber.	5 M	1	Understand
	b)	Explain the qualities of a good timber.	5 M	1	Understand
		UNIT-II			
3.	a)	What is the chemical composition of Portland cement?	5 M	2	Remember
	b)	Explain any two laboratory test for cement?	5 M	2	Understand
		(OR)			
4.	a)	What are the Various ingredients used in cement concrete	5 M	2	Remember
	b)	Explain about initial and final tests of cement	5 M	2	Understand
		UNIT-III			
5.	a)	Explain any two concrete tests in detail?	5 M	3	Understand
	b)	Explain crushing test and impact test of concrete.	5 M	3	Understand
		(OR)			
6.	a)	What are the factors affecting the workability of concrete?	5 M	3	Remember
	b)	What is Workability and explain various factors influencing the Workability?	5 M	3	Remember
		UNIT-IV			
7.	a)	Explain in detail the factors influencing the strength results in case of hardened concrete.	5 M	4	Understand
	b)	Write a brief note on rebound hammer test.	5 M	4	Understand
		(OR)			
8.	a)	What is the relation between compressive strength and tensile strength of concrete?	5 M	4	Remember
	b)	What are the different NDT tests?	5 M	4	Remember

UNIT-V

9.	a)	What are the factors affecting properties of fiber reinforced concrete?	5 M	5	Remember
	b)	Difference between High performance concrete and high density concrete.	5 M	5	Understand
		(OR)			
10.		Explain the following, i) Light weight aggregate concrete ii) SIFCON iii) Types of polymer concrete	10 M	5	Understand

UNIT-VI

11.		Design a concrete mix for characteristic strength of 30MPa at 28 days with a standard deviation of 4MPa.The specific gravity of FA and CA are 2.60 and 2.70 respectively. A slump of 50mm is necessary. The specific gravity of cement is 3.15.Assuming the necessary data design the mix as per IS code method.	10 M	6	Apply
		(OR)			
12.		Design a concrete mix of M20 grade for a roof slab. Take a Standard deviation of 4MPa. The specific gravities of Coarse Aggregate and Fine Aggregate are 2.73 and 2.60 respectively. The bulk density of coarse aggregate is 1615kg/m3 and fineness modulus of fine aggregate is 2.74. A slump of 55mm is necessary. The water absorption of coarse aggregate is 1% and free moisture in fine aggregate is 2%. Design the concrete mix using IS code method. Assume any missing data suitably.	10 M	6	Apply

AR20

CODE: 20BST203 **SET - 2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, December, 2022
COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to MECH & EEE Branches)

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.	Prove that z^n (n is a positive integer) is analytic and hence find its derivative.	10M	CO1	Apply K3
	(OR)			
2.	Prove that the function f(z) defined by $f(z) = \begin{cases} \frac{y^2x(x+iy)}{x^2+y^4}, (z \neq 0) \\ 0, \quad if \ (z=0) \end{cases}$ Is not analytical at z=0 although Cauchy-Riemann equations are satisfied at the origin.	10M	CO1	Apply K3
	UNIT-II			
3.	Evaluate $a)\ \int_{(0,0)}^{(1,3)} 3x^2y\,dx + (x^3 - 3y^2)dy$ b) $\int_{(0,0)}^{(1,3)} x^2y\,dx + (x^2 - y^2)dy$ along the curve (i)$y = 3x$. (ii)$y = x^2$	10M	CO2	Apply K3
	(OR)			
4.	Evaluate $\oint_C \frac{cos\pi z^2}{(z-2)^3} dz$ where C is $\|z\| = 3$, by using Cauchy's integral formula.	10M	CO2	Evaluate K3
	UNIT-III			
5.	Find the residue of $f(z) = \frac{z^3}{(z-1)^4(z-2)(z-3)}$ $at\ z = 1$	10M	CO3	Apply K3
	(OR)			
6.	Find the poles and residue at each pole of $tanh\, z$.	10M	CO3	Apply K3
	UNIT-IV			
7.	Let X have the binomial distribution with probability distribution $b(x\|n,p) = \binom{n}{x} p^x(1-p)^{n-x}$ for x = 0,1, … , n and show that $(a)\ M(t) = (1 - p + pe^t)^n$ for all t. $(b)E(X) = np$ and $Var(X) = np(1-p)$	10M	CO4	Apply K3
	(OR)			

8.	In an examination it is laid down that a student passes if he secures 40% or more. He is placed in the first, second and third division according as he secures 60% or more marks, between 50% and 60% marks and marks between 40% and 50% respectively. He gets a distinction in case he secures 75% or more. It is noticed from the results that 10% of the students failed in the examination; where as 5% of them obtained distinction. Calculate the percentage of students placed in the second division.	10M	CO4	Apply K3

UNIT-V

9.	Find the mean, standard deviation, the mean of the sampling distribution of means the standard deviation of the sampling distribution of means for the population consisting of 5 numbers 2,3,6,8 and 11 by drawing samples of two with replacement.	10M	CO5	Apply K3
	(OR)			
10.	A research worker wants to determine the average time it takes a mechanic to rotate the tires of a car, and she wants to be able to assert with 95% confidence that the mean of her sample is off by at most 0.50 minute. If she can presume from past experience that σ = 1.6 minutes, how large a sample will she have to take?	10M	CO5	Analysis K3

UNIT-VI

11.	A process for producing vinyl floor covering has been stable for a long period of time, and the surface hardness measurement of the flooring produced has a normal distribution with mean 4.5 and standard deviationσ = 1.5. A second shift has been hired and trained and their production needs to be monitored. Consider testing the hypothesisH_0: μ = 4.5 versus H_1: $\mu \neq 4.5$. Arandom sample of hardness measurements is made of n = 25 vinyl specimens produced by the second shift. Calculate the P-value when using the test statistic $Z = \frac{\bar{X}-4.5}{1.5/\sqrt{25}}$ if $\bar{X} = 3.9$.	10M	CO6	Analysis K3
	(OR)			
12.	200 digits were chosen at random from a set of tables. The frequencies of the digits are shown below:	10M	CO6	Analysis K3

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Use the Chi square test to assess the correctness of the hypothesis that the digits were distributed in equal number in the tables from which these were chosen.

CODE: 20BST208 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular/Supplementary Examinations, December, 2022

PROBABILITY ANDSTOCHASTIC PROCESS

(Electrical 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

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	A die is tossed. Find the probabilities of the events A={odd number shows up}, B={number larger than 3 shows up}, $A \cup B$, and $A \cap B$.	5M	CO1	K1
	b)	You (person A) and two others (B and C) each toss a fair coin in a two-step gaming game. In step 1 the person whose toss is not a match to either of the other two is "odd man out". Only the remaining two whose coins match go on to step 2 to resolve the ultimate winner. (i) What is the probability that you will advance to step 2 after the first toss? (ii) What is the probability that you will be out after first toss?	5M	CO1	K1
		(OR)			
2.	a)	A pack contains 4 white and 2 green pencils. Another contains 3 white and 5 green pencils. If one pencil is drawn from each pack, find the probability that (i) both are white and (ii) one is white and another is green.	5M	CO1	K1
	b)	Box I contains 1 white and 999 red balls. Box II contains 1 red and 999 white balls. A ball is picked from a randomly selected box. If the ball is red, what is the probability that it came from box I.	5M	CO1	K1
		UNIT-II			
3.	a)	A random variable X has the following probability function: (i) Determine K (ii) Evaluate $P(X < 6), P(X \geq 6)$	5M	CO2	K4
	b)	Determine whether the following is a valid distribution function: $F(X) = \begin{cases} 0, & x < 0 \\ 1 - e^{-x/2}, & x \geq 0 \end{cases}$	5M	CO2	K4
		(OR)			
4.	a)	The natural numbers are the possible values of a random variable X: that is $x_n = n, n = 1, 2, \ldots$. These numbers occur with probabilities $P(x_n) = \left(\frac{1}{2}\right)^n$. Determine the expected value of X	5M	CO2	K4
	b)	Prove that central moments μ_n are related to moments m_k about the origin by $\mu_n = \sum_{k=0}^{n} \binom{n}{k} (-\bar{X})^{n-k} m_k$.	5M	CO2	K4
		UNIT-III			
5.	a)	Construct a binomial distribution to thefollowing data:	5M	CO3	K3
	b)	The average number of phone calls/minute coming into a switch board between 2 and 4PM is 2.5. Determine the probability that during oneparticular minute there will be (i) 0 (ii) 1 (iii) 2 (iv) 3 (v) 4 or fewer calls.	5M	CO3	K4

x	0	1	2	3	4	5	6	7
$P(x)$	0	K	$2K$	$2K$	$3K$	K^2	$2K^2$	$7K^2$+K

X	0	1	2	3	4
f	30	62	46	10	2

(OR)

6. a) Constructa Poisson distribution to the following data: 5M CO3 K3

x:	0	1	2	3	4	5	6	7	8
Observed Frequency f_i	56	156	132	92	37	22	4	0	1

b) Determine the probability distributionof the number of bad eggs in a box of 6 chosen atrandom if 10% of eggs are bad, in a large consignment. 5M CO3 K4

UNIT-IV

7. a) Two events A and B defined on a sample space S are related to a joint sample space through random variables X and Y and are defined by $A = \{x_1 < X \leq x_2\}$ and $B = \{y_1 < Y \leq y_2\}$. Make a sketch of the two sample spaces showing areas corresponding to both events and the event $A \cap B = \{X \leq x, y_1 < Y \leq y_2\}$. 5M CO4 K3

b) A fair coin is tossed twice. Define random variables by: *X*= "number of heads on the first toss" and *Y*= "number of heads on the second toss" (note that *X* and *Y* can have only the values 0 or 1). 5M CO4 K1

(i) Find the joint density function of *X* and *Y*.

(ii) Find the joint distribution function.

(OR)

8. a) Two random variables X and Y have a joint probability density function $f_{X,Y}(x,y) = \begin{cases} \frac{5}{16}x^2y, & 0 < y < x < 2 \\ 0 & elsewhere \end{cases}$ 5M CO4 K3

(i) Find the marginal density functions of *X* and *Y*

(ii) Are *X* and *Y* statistically independent?

b) Random variables X and Y have the joint density $f_{X,Y}(x,y) = \begin{cases} \frac{1}{24}, & 0 < x < 6,\ 0 < y < 4 \\ 0 & elsewhere \end{cases}$. What is the expected value of the function $g(X,Y) = (XY)^2$? 5M CO4 K1

UNIT-V

9. a) Show that the random process $X(t) = A\cos(\omega_0 t + \Theta)$ is wide-sense stationary if it is assumed that A and ω_0 are constants and Θ is a uniformly distributed random variable on the interval $(0, 2\pi)$. 5M CO5 K2

b) If the autocorrelation for a stationary process is $R_{XX}(\tau) = 25 + \frac{4}{1+\tau^2}$ then evaluate the mean value and variance of the process $X(t)$. 5M CO5 K5

(OR)

10. a) State and explain various properties of autocorrelation function 5M CO5 K2

b) The power spectral density of X(t) is given by 5M CO5 K5

$S_{xx}(\omega) = \begin{cases} 1 + \omega^2; \text{ for } |\omega| < 1 \\ 0 \text{ ; otherwise} \end{cases}$

Find the autocorrelation function.

UNIT-VI

11. a) Illustrate the relationship between Power spectrum and Auto correlation. 5M CO6 K2

b) The spectral density of a WSS random process X(t) is given by 5M CO6 K1

$S_{XX}(\omega) = \frac{\omega^2}{\omega^4 + 13\omega^2 + 36}$

Find the autocorrelation and average power of the process.

(OR)

12. a) Illustrateall the properties of the cross-Power Density spectrum. 5M CO6 K2

b) A wide-sense stationary noise process $N(t)$ has an autocorrelation function $R_{NN}(\tau) = Pe^{-3|\tau|}$ where P is a constant. Find its power spectrum. 5M CO6 K1

AR20

CODE: 20EST205 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular & Supplementary Examinations, December, 2022

DIGITAL LOGIC DESIGN

(Common to CSE, IT & CSM)

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)	Calculate the decimal digit 263 in (i) Binary Code (ii) BCD Code (iii) Excess -3 Code	5	CO1	Apply
	b)	Explain about Weighted Codes with examples?	5	CO1	Understand
		(OR)			
2.	a)	Describe the binary number 1011 in (i) Gray code (ii) Octal code (iii) Hexa decimal code	5	CO1	Understand
	b)	Calculate 1's and 2's complements of the following binary numbers (i) 10001 (ii) 10111 (iii) 11100	5	CO1	Apply
		UNIT-II	Marks	CO	Blooms Level
3.	a)	Solve the following Boolean expression to a minimum number of literals. (i) f = a + bd + bc + (d+ a (c'+d')') (ii)F = B'C'D + (B+C+D)' +B'C'D'E	5	CO2	Apply
	b)	Solve F=∑ (1,2,4,6,8,10,12,14) using K Map.	5	CO2	Apply
		(OR)			
4.	a)	Define and Prove De Morgans theorem. Find Duality of the expression F= (a+b') (c+d+e') (b' +0)	5	CO2	Remember
	b)	Solve the following Boolean function using four-variable map. F (w, x, y, z) = ∑ m F= Σ (0,1,4,6,7,9,11,15) + d (10,14)	5	CO2	Apply
		UNIT-III	Marks	CO	Blooms Level
5.	a)	Explain the logic diagram of Full Adder with truth table.	5	CO3	Understand
	b)	Design a 4 Bit binary to Excess 3 Code Converter?	5	CO3	Create
		(OR)			

			Marks	CO	Blooms Level
6.	a)	Design Full Subtractor circuit.	5	CO3	Create
	b)	Design 4-bit binary parallel adder with carry lookahead generator.	5	CO3	Create

UNIT-IV

			Marks	CO	Blooms Level
7.	a)	Design a 2-bit Magnitude Comparator.	5	CO4	Create
	b)	Design a BCD to Excess 3 code convertor using decoder and four OR gates.	5	CO4	Create
		(OR)			
8.	a)	Implement a 8x1 with 4x1 Multiplexers.	5	CO4	Apply
	b)	Implement the following Boolean function with a multiplexer. F= Σ (0,1,3,4,8,9,15)	5	CO4	Apply

UNIT-V

			Marks	CO	Blooms Level
9.	a)	Design Binary to Gray code convertor using PROM.	5	CO5	Create
	b)	Design an Excess -3 to BCD code convertor using PAL	5	CO5	Create
		(OR)			
10.	a)	Derive the PLA table for a combinational circuit that squares a 3- bit no. Minimize the no of product terms.	5	CO5	Analyse
	b)	Design BCD to seven segment display circuit using PAL	5	CO5	Create

UNIT-VI

			Marks	CO	Blooms Level
11.	a)	Explain D Flip-flop and convert SR flip-flop to T.	5	CO6	Understand
	b)	Design a Decade Counter using Flipflop?	5	CO6	Create
		(OR)			
12.	a)	Design and explain Universal shift register?	5	CO6	Understand
	b)	Design Ring counter with neat diagram.	5	CO6	Create

AR18

CODE: 18CET205 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December, 2022

CONCRETE TECHNOLOGY

(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 in detail the process of hydration of cement.	5M
	b)	What is gradation of aggregates and explain how the aggregates gradation is done	7M
		(OR)	
2.	a)	Discuss in detail the various tests to be carried out to determine the quality of cement.	6M
	b)	Explain about important reasons why it is desirable to use pozzolanic admixtures in concrete	6M

UNIT-II

3.	a)	what is workability of concrete and discuss about the slump test to measure the workability of concrete.	7M
	b)	Discuss about the factors affecting workability of fresh concrete	5M
		(OR)	
4.	a)	What is segregation and bleeding of concrete why they occur, discuss how to prevent them	5M
	b)	Mention the tests carried out on the hardened concrete and explain compression test on concrete specimens	7M

UNIT-III

.	a)	Explain about ultra-pulse velocity test to determine the quality of concrete	7M
	b)	What is modulus of elasticity of concrete? Explain the difference between the dynamic and static moduli of elasticity of concrete	5M
		(OR)	
6.	a)	Explain about the flexure test on concrete specimens	5M
	b)	What is creep of concrete? Explain about the factors affecting creep of concrete	7M

UNIT-IV

7.		Design a M30 grade concrete mix by BIS method with the following data: specific gravity of cement, Coarse aggregate and fine aggregate are: 3.15, 2.7and 2.60 respectively. Water absorption for coarse aggregate and fine aggregate are 0.60 and 0.50 percentage respectively. Free moisture Nil. Degree of quality control good and exposure moderate. Determine the quantities of ingredients in kg/m3 of concrete.	12M
		(OR)	
8.	a)	Discuss the step-by-step procedure of mix design by BIS method	8M
	b)	Discuss about the Acceptance criteria of concrete	4M

UNIT-V

9.	a)	Distinguish high strength and High performance concrete	5M
	b)	Write about Self compacting concrete its development and fresh properties	7M
		(OR)	
10.	a)	Discuss in brief about Cellular concrete and No-fines concrete	6M
	b)	What is Fibre reinforced concrete and write about its applications.	6M

AR18

CODE: 18BST204 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December, 2022

COMPLEX VARIABLES AND STATISTICAL METHODS

(Common to EEE, ME & ECE)

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) Show that f(z) = xy + iy is everywhere continuous but is not analytic. 6M
   b) Show that the function $u = e^{-2xy}\sin(x^2 - y^2)$ harmonic. 6M

(OR)

2. Find the analytic function and its imaginary part whose real part is $\frac{\sin 2x}{\cosh 2y - \cos 2x}$ by Milne-Thompson method 12M

UNIT-II

3. Using Cauchy's integral formula to Evaluate $\oint_C \frac{z}{z^2 - 3z + 2}dz$, around C: $|z-3| = \frac{1}{2}$ 12M

(OR)

4. Using Residue theorem , to evaluate $\int_C \frac{4-3z}{z(z-1)(z-2)}dz \quad around\ C: |z| = \frac{3}{2}$ 12M

UNIT-III

5. Show that for a Normal distribution the mean, median and mode are same. 12M

(OR)

6. Fit a binomial distribution for the following data 12M

x	0	1	2	3	4	5	6
f	5	18	28	12	7	6	4

UNIT-IV

7. The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68 inches respectively . Can the samples be regarded as drawn from the same population of S.D 2.5 inches. 12M

(OR)

8. Before an increase in excise duty on tea, 800 people out of a sample of 1000 were consumers of tea. After the increase in duty, 800 people were consumers of tea in a sample of 1200 persons. Find whether there is significant decrease in the consumption of tea after the increase in duty. 12M

UNIT-V

9 Find the power curve of the form $y = ax^b$ for the following data 12M

x	1	2	4	6
y	6	4	2	2

(OR)

10. a) Compute the coefficient of correlation between X and Y using the following data 6M

X	65	67	66	71	67	70	68	69
Y	67	68	68	70	64	67	72	70

b) In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible: Variance of X=1. The regression equations are $3x + 2y = 26$ and $6x + y = 31$. What were (i) the mean values of X and Y? and (ii) the correlation between X and Y? 6M

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AR18

CODE: 18EST206 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December, 2022

DIGITAL LOGIC DESIGN

(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)	Convert the Octal number 623 to decimal, binary, and hexadecimal.	6 M
	b)	Write a short note on binary storage and registers.	6 M

(OR)

2.	a)	Convert the following numbers: i) 11001101.0101 to base 8 and base 4 ii) $(1776)_{10}$ to base 6 iii)11001010.0101 to base 10	6 M
	b)	Convert the following binary numbers into gray code. i) 10100101 ii) 01011011	6 M

UNIT-II

3.	a)	Draw the block diagram of a BCD adder. Explain the circuit with the help of a truth table.	6 M
	b)	Prove the following Boolean theorms: (i) x + x = x (ii) x+1=1	6 M

(OR)

4.	a)	Convert the following expressions into product of sums form: i) $(AB + C)(B + C'D)$ ii) $x' + x(x + y')(y + z')$	6 M
	b)	Minimize the following function using K-map and realize using NAND gates: $F(w,x,y,z) = \sum(0,2,3,4,6,7,8,10,13) + d(5,14)$	6 M

UNIT-III

5.	a)	Draw the Truth table and Logic diagram of a 3×8 decoder circuit.	6 M
	b)	Draw the full-adder circuit.	6 M

(OR)

6.	a)	Design a combinational circuit for 2-bit magnitude comparator with inputs as a_1a_0, b_1b_0 and outputs as *a*lt*b*, *a*eq*b* and *a*gt*b*.	6 M
	b)	Design a 4-bit universal shift register.	6 M

UNIT-IV

7.	a)	Construct the PROM using the conversion from BCD code to Excess-3 code?	6 M
	b)	Implement the following function using PAL F=Σm(0,2,3,7,9,11,15)	6 M

(OR)

8.	a)	Write difference between PROM ,PLA &PAL?	6 M
	b)	Implement the following Boolean functions with a PROM: A(x,y,z)=Σ(1,2,4,6); B(x,y,z)=Σ(0,1,6,7); C(x,y,z)=Σ(2,6); D(x,y,z)=Σ(1,2,3,5,7).	6 M

UNIT-V

9.	a)	Draw the logic diagram of positive edge-triggered D-flipflop using NAND gates and explain.	6 M
	b)	Write the differences between sequential and combinational circuits.	6 M

(OR)

10.	a)	Draw the circuit diagram of a 4-bit Ring Counter.	6 M
	b)	Draw the circuit diagram of Decade counter.	6 M

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AR16

CODE: 16ME2008 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December, 2022

FLUID MECHANICS & HYDRAULIC MACHINERY

(Common to EEE & ME)

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) Develop fundamental equation of statics. 6m

   b) Calculate the capillary effect in millimetres in a glass tube of 4 mm diameter, when immersed in (i) water, and (ii) mercury. The temperature of the liquid is 20^0 C and the values of the surface tension of water and mercury at 20^0 C in contact with air are 0.073575 N/m and 0.51 N/m respectively. The angle of contact for water is zero and that for mercury is $130^{0.}$. Take density of water at 20^0 C as equal to 998 kg/m^3 8m

(OR)

2. Derive 3 dimensional continuity equation in rectangular Cartesian coordinate system. 14m

UNIT-II

3. State the impulse momentum principle and explain how force on a pipe bend can be evaluated using momentum equation. 14m

(OR)

4. a) Explain the working of Piton tube with a neat sketch and derive the expression for velocity of flow. 7m

   b) An orifice meter with orifice diameter 10cm is inserted in a pipe of 20cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter gives readings of 19.62 N/cm^2 and 9.81 N/cm^2 respectively. Co-efficient of discharge for the orifice meter is given as 0.6. Find the discharge of water through the pipe. 7m

UNIT-III

5. a) List out the various minor losses occurring in flow through pipes and give expression for each. 7m

   b) Two sharp ended pipes of diameters 50 mm and 100 mm respectively, each of length 100m are connected in parallel between two reservoirs which have a difference of level of 10 m. If the co-efficient of friction for each pipe is 0.32, calculate the rate of flow for each pipe and also the diameter of a single pipe 100 m long which would give the same discharge, if it were substituted for the original two pipes.. 7m

(OR)

6. a) Obtain an expression for the force exerted by a jet of water on the inclined pate moving in the direction of jet. 6m

   b) A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45^0 to the axis of the jet. Find the normal pressure on the plate : (i) when the plate is stationary, and (ii) when the plate is moving with a velocity of 15 m/s and away from the jet. Also determine the power and efficiency of the jet when the plate is moving. 8m

UNIT-IV

7. a) Explain the working of Simple Pelton when with the help of a neat sketch.. 6m

   b) The internal and external diameters of an outward reaction turbine are 2m and 2.75 m respectively. The turbine is running at 250 rpm and rate of flow of water through the turbine is 5 m^3/s. The width of the runner is constant at inlet and outlet and is equal to 250 mm. The head on the turbine is 150 m. Neglecting thickness of the vanes and taking discharge radial at outlet, determine: (i) Vane angles at inlet and outlet and (ii) Velocity of flow at inlet and outlet. 8m

(OR)

8. a) Define Unit speed and Unit discharge and derive the expressions for the same 8m

   b) A turbine develops 9000 kW when running at 10 rpm. The head on the turbine is 30m. If the head on the turbine is reduced to 18m, determine the speed and power developed by the turbine. 6m

UNIT-V

9. a) Define (i) Manometric efficiency (ii) Mechanical efficiency and (iii) Overall efficiency of a centrifugal pump and write the expressions for the same. 6m

   b) The internal and external diameter of an impeller of a centrifugal pump which.is running at 1000 rpm are 200mm and 400 mm respectively. The discharge through pump is 0.04 m^3/s and velocity of flow is constant and equal to 2.0 m/s. The diameters of the suction and delivery pipes are 150 mm and 100 mm respectively and suction and delivery heads are 6m(abs) and 30(abs) of water respectively. If the outlet vane angle is 45^0 and power required to drive the pump is 16.186 kW, determine: (i) Vane angle of the impeller at inlet (ii) The overall efficiency of the pump, and (iii) Manometric efficiency of the pump. 8m

(OR)

10. a) List out the important components of a Reciprocating pump and develop expressions for discharge and power required to drive the pump. 7m

    b) A double acting reciprocating pump, running at 50 rpm is discharging 900 litres of water per minute. The pump has stroke of 400 mm. The diameter of piston is 250 mm. The delivery and suction heads are 25m and 4 m respectively. Find the slip of the pump and power required to drive the pump. 7m

AR16

CODE: 16EC2011 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December, 2022

DIGITAL LOGIC DESIGN

(Common to CSE & IT)

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) Write the difference between Analog systems and Digital system. 4M
   b) Convert the following: 10M
      i) $360.15_{(8)}$ to Decimal and then to Binary.
      ii) $234_{(10)}$ to Octal and then to Hexa decimal.

(OR)

2. a) i) State Duality Theorem. 7M
      ii) Obtain the dual of the function (A+B)(C+D)= AC+AD+BC+BD
   b) Simplify the following expression and realize the reduced function using the basic gates. Y=A'B'C'D'+A'BC'D'+A'B'C'D 7M

UNIT-II

3. Reduce the following Logic function 14M
   F(A,B,C,D)= $\sum$ m(0,1,2,5,6,8) +d (3,4,7,14) using the appropriate variable K- Map method in Sum of products form. Also realize the reduced expression using basic gates.

(OR)

4. a) Design a full adder circuit using necessary half adders. 7M
   b) Design a 2-bit by 2-bit binary multiplier. 7M

UNIT-III

5. a) Design a 4-line- to- 16- line Decoder using 3-line to 8 line decoders using an enable input. 7M
   b) Implement a Boolean function F(x,y,z)= $\sum$ m(1,2,6,7) using a 4:1 Multiplexer. 7M

(OR)

6. a) Design a Full adder circuit using a suitable decoder. 7M
   b) What is a Magnitude comparator? Explain how an Exclusive OR Gate is used as a basic comparator. 7M

UNIT-IV

7. a) Draw and Explain the structure of PROM. 4M
   b) Design a PROM. Structure to implement the following Boolean function. 10M
      $F_1 = \sum$ m(0,2,5,7)
      $F_2 = \sum$ m (1,3,4)
      $F_3 = \sum$ m (0,2,3,5,7)
      $F_4 = \sum$ m (1,2,3,5,6,7)

(OR)

8. Design a PAL circuit to implement the following combinational logic functions 14M
   $X_1 = \sum$ m (1,2,3,5,7,8,10,12,14)
   $X_2 = \sum$ m (7,11,13,14,15)

UNIT-V

9. a) Explain how Master- Slave JK flip-flop avoids the race around condition. 7M
   b) Convert a JK flip-flop to T-flip flop with the help of conversion table. 7M

(OR)

10. Explain how different kinds of data shifts can take place in Universal shift register, with a neat logic diagram. 14M

AR13

CODE: 13EC2006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December, 2022
DIGITAL LOGIC DESIGN
(Common to CSE and IT)

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

PART-A

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

1. a) What is the binary equivalent of the decimal number $(368)_{10}$?
   b) $(734)_8 = ()_{16}$
   c) Define r's and (r-1)'s complement
   d) Draw the circuit of NAND gate with truth table
   e) Define digital clock .
   f) What is Multiplexer?
   g) Difference between Latch and Flip flop.
   h) What is Asynchronous circuit?
   i) What is Parity bit?
   j) What is Duality theorem in Boolean algebra?

PART-B

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

UNIT-I

2. a) Express the following numbers in decimal. 6
      i) $(10110.0101)_2$ ii) $(16.5)_{16}$ iii) $(26.24)_8$
   b) Discuss the subtraction of two numbers using 1's complement with simple example. 6

(OR)

3. a) What are the universal logic gates? why they are so called? Perform the realization of all the logical gates using NAND gates 6
   b) Obtain the Dual and complement of the following. 6
      i) A'B +A'BC'+A'BCD+ A'BC'D'E

UNIT-II

4. a) Explain in brief the concept of simplification in K-map. 6
   b) Simplify the following Boolean function 6
   $F(A,B,C,D)= \sum m(1,3,7,11,15) + \sum d(0,2,5)$

(OR)

5. a) With the help of logic diagram explain a parallel adder/Subtractor system 6
   b) Design a Full Subtractors using Two half Subtractors. 6

UNIT-III

6. a) Draw the logic circuit of 8 to 3 line Encoder using three 4 input NAND gates. 6
   b) Design a combinational circuit for Multiplexer 6

(OR)

7. a) Explain the operation of priority encoder with a neat diagram. 6
   b) Design a combinational circuit for binary to BCD converter. 6

UNIT-IV

8. a) Draw the block diagram of PLA and explain its operation. 6
   b) Implement the following functions using PROM 6
      i) F1= ∑(0,2,5,7,8,9,10,12)
      ii) F2 = ∑m(1,2,3,4,6,7,8,11,13,15)

(OR)

9. a) Tabulate the PLA programming table for the following Boolean function 6
      i) F1 (x, y, z)= ∑m(0,2,3,7) ii). F2 (x,y,z)= ∑m(1,3,4,6)
      iii) F3(x,y,z)= ∑m(1,4)
   b) Give the comparison between PROM,PLA and PAL. 6

UNIT-V

10. a) Explain the Master-Slave JK Flip Flop, explain its operation and how the race around condition is avoided. 6
    b) Write the characteristic, Excitation tables for JK ,T and D Flip Flops. 6

(OR)

11. a) Draw the circuit diagram of Johnson counter and explain its operation with the help of bit pattern. 6
    b) Define parallel counters. Draw the logic diagram for Synchronous counter that count from 0000 to 1111 . Explain how it counts the numbers. 6

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