AR20

CODE: 20CET202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June-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)	Define Timber? State the Defects in Timber?	5M	CO1	L1
	b)	Define Stone Quarrying? Explain the Precautions to be considered in Blasting?	5M	CO1	L2
		(OR)			
2.	a)	Explain the Composition of good Brick earth?	5M	CO-1	L2
	b)	Explain in detail about the Classification of Stones?	5M	CO-1	L2
		UNIT-II	Marks	CO	Blooms Level
3.	a)	Define Acceleration? Explain about the water proofers?	5M	CO-2	L2
	b)	Define Plasticizers? Explain about the Silica fume?	5M	CO-2	L2
		(OR)			
4.	a)	Define Admixture? Explain the Importance of Admixture?	5M	CO-2	L2
	b)	Explain about the importance of Retarders in detail?	5M	CO-2	L2
		UNIT-III	Marks	CO	Blooms Level
5.	a)	Explain the types of Slump with neat sketches?	5M	CO-3	L3
	b)	Explain about the Compaction Factor test with neat Sketch?	5M	CO-3	L2
		(OR)			
6.	a)	Define Bleeding? Explain about the Bleeding ion a Mix Design	5M	CO-3	L2
	b)	Explain the factors which are influence the workability	5M	CO-3	L2
		UNIT-IV	Marks	CO	Blooms Level
7.	a)	Define Abram's law? State the importance of Curing?	5M	CO-4	L2
	b)	Explain about the Compression Test in detail with Standard size of Cubes?	5M	CO-4	L2
		(OR)			
8.	a)	Explain about the Soundness Test of Cement?	5M	CO-4	L2
	b)	Explain about the Flexure test?	5M	CO-4	L2
		UNIT-V	Marks	CO	Blooms Level
9.	a)	Explain about the light weight concrete and cellular concrete	5M	CO-5	L2
	b)	Explain about the Polymer Concrete and High -performance concrete?	5M	CO-5	L2
		(OR)			
10.	a)	Explain about the High density concrete and Fibre reinforced concrete?	5M	CO-5	L2
	b)	Explain about the No fines concrete and Ready-mix Concrete?	5M	CO-5	L2
		UNIT-VI	Marks	CO	Blooms Level
11.	a)	Design the Mix Proportion for M25 Grade Concrete with Mild Exposure ? With required assumed data?	10M	CO-6	L3
		(OR)			
12.	a)	Design the mix design for M35 grade concrete assume the required data ?	10M	CO-6	L3

AR20

CODE: 20BST203 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June-2022

COMPLEX VARIABLES AND STATISTICAL METHODS

(Common to EEE & MECH 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.	Show that the function $\|z\|^2$ is continuous and differentiable at the origin, but it is not analytic at any point.	10M	1	apply
	(OR)			
2.	Show that the function $f(z) = \sqrt{\|xy\|}$ is not regular at the origin, although Cauchy-Riemann equations are satisfied at the origin.	(10M)	1	apply
	UNIT-II	Marks	CO	Blooms Level
3.	Use Cauchy's integral formula to evaluate $\int_C \frac{\sin\pi z^2 + \cos\pi z^2}{(z-2)(z-3)} dz$, where C is the circle $\|z\| = 4$.	(10M)	2	apply
	(OR)			
4.	Evaluate $\int_C \frac{7z-1}{z^2-3z-4} dz$, where C is the ellipse $x^2+y^2 = 4$ using Cauchy's integral formula.	(10M)	2	apply
	UNIT-III	Marks	CO	Blooms Level
5.	Find the poles of $f(z) = \frac{z^2+4}{z^5+2z^3+2z}$ and the corresponding residues.	(10M)	3	apply
	(OR)			
6.	Evaluate $\int_C \frac{(z+1)}{z^2+2z+4} dz$, where C is $\|z+1+i\| = 2$.	(10M)	3	apply

		Marks	CO	Blooms Level
	UNIT-IV			
7.	Out of 800 families with 4 children each, how many families would be expected to have (a) 2 boys and 2 girls (b) at least 1 boy (c) at most 2 girls (d) children of both sexes.	(10M)	4	apply
	(OR)			
8.	Show that the mean=median=mode in a Normal Distribution.	(10M)	4	apply
	UNIT-V	Marks	CO	Blooms Level
9.	In a city A, 20% of a random sample of 900 school boys had a certain slight physical defect. In another city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant?	(10M)	5	apply
	(OR)			
10.	An unbiased coin is thrown n times. It is desired that the relative frequency of the appearance of heads should lie between 0.49 and 0.51. Find the smallest value of n that will ensure this result with 90% confidence.	(10M)	5	apply
	UNIT-VI	Marks	CO	Blooms Level
11.	The following data represents the monthly sales (in Rs) of a certain retail stores in a leap year. Examine if there is any seasonality in the sales. 6100, 5600, 6350, 6050, 6250, 6200, 6300, 6250, 5800, 6000, 6150 and 6150.	(10M)	6	apply
	(OR)			
12.	The mean lifetime of a sample of 25 bulbs is found as 1550 hours with an S.D. of 120 hours. The company manufacturing the bulbs claims that the average life of their bulbs is 1600 hours. Is the claim acceptable at 5% level of significance?	(10M)	6	apply

AR20

CODE: 20BST208 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June-2022

PROBABILITY AND STOCHASTIC PROCESS

(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

			Marks	CO	Blooms Level
		UNIT-I			
1.		If A, B and C are events such that $P(A)=0.4, P(B)=0.3$ and $P(A\cup B)=0.6$, determine (i) $P\left(\frac{B}{A}\right)$ (ii) $P\left(\frac{A}{B}\right)$	10M	CO1	K3
		(OR)			
2.	a)	State and Explain with necessary expressions, the Baye's theorem	5M	CO1	K2
	b)	A number is selected at random from (1, 2, . . . , 100). Given that the number selected is divisible by *2,* determine the probability that it is divisible by 3 or 5.	5M	CO1	K3

			Marks	CO	Blooms Level
		UNIT-II			
3.		A random variable X has the following probability distribution.	10M	CO2	K3

X	0	1	2	3	4	5	6	7
P(X=x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Obtain (i)k (ii)P(X<6), P(X≥6) and P(0<X<5) (iii) mean and variance (iv)Distribution function.

(OR)

4.	a)	Explain in detail about characteristic function.	5M	CO2	K2
	b)	Let X be a continuous r.v. X with pdf, $f_X(x)=\begin{cases}kx & 0<x<1\\ 0 & \text{otherwise}\end{cases}$ where *k* is a constant. Find the value of k and P(1/4 <X≤1/2).	5M	CO2	K3

			Marks	CO	Blooms Level
		UNIT-III			
5.	a)	Explain in detail about Gaussian density function.	5M	CO3	K2
	b)	Show that mean and variance of random variable X with uniform distribution over (a,b) is (a+b)/2 and $(a-b)^2/12$ respectively.	5M	CO3	K3
		(OR)			
6.	a)	Explain about binomial and Poisson distributions	5M	CO3	K2
	b)	State and prove central limit theorem for identical and independent random variables	5M	CO3	K2

			Marks	CO	Blooms Level
		UNIT-IV			
7.	a)	Determine PDF of sum of two random variables.	5M	CO4	K2
	b)	A joint density is given as $f_{X,Y}(x,y)=\begin{cases} x(y+1.5) & for\ 0<x<1; 0<y<1 \\ 0 & otherwise \end{cases}$ Find all the joint moments m_{nk}, n and k = 0,1.	5M	CO4	K3
		(OR)			
8.	a)	Define and explain the Joint Distribution Function and its properties.	5M	CO4	K2
	b)	If X and Y are two independent random variables such that E[X] = λ1, variance of X is σ12, E[Y] = λ2, variance of Y is σ22, then calculate the co-variance of [X,Y]	5M	CO4	K3
		UNIT-V	Marks	CO	Blooms Level
9.	a)	Explain stationary random process in detail.	5M	CO5	K2
	b)	If $Y_1(t) = X_1\cos\omega t + X_2\sin\omega t$ and $Y_2(t) = X_1\sin\omega t + X_2\cos\omega t$ where X_1 and X_2 are zero mean independent random variables with unity variance. Show that the random processes $Y_1(t)$ and $Y_2(t)$ are individually WSS.	5M	CO5	K3
		(OR)			
10.	a)	Derive the expression for autocorrelation function? Explain its properties in detail.	5M	CO5	K2
	b)	A random process Y(t) = X(t)-X(t+τ) is defined in terms of a process. X(t) that is at least WSS. (i) show that mean value of Y(t) s zero even if X(t) has a non zero mean value. (ii) If Y(t) =X(t)+X(t+τ). Find E(Y(t)] and σ^2 of Y.	5M	CO5	K3
		UNIT-VI	Marks	CO	Blooms Level
11.	a)	State and prove the properties of power density spectrum	5M	CO6	K2
	b)	Consider a WSS random process X(t) with $R_X(\tau)=e^{-a\|\tau\|}$, where a is a positive real number. Find the PSD of X(t).	5M	CO6	K3
		(OR)			
12.	a)	State and prove properties of cross power density spectrum	5M	CO6	K2
	b)	Let X(t) = cos(ωt + θ) and Y(t) = sin(ωt + θ) where θ is a random variable uniformly distributed in [-π, π]. Find the cross-covariance of X(t) and Y(t).	5M	CO6	K3

AR20

CODE: 20EST205 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June-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

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Calculate decimal digit 147 in (i) Binary Code (ii) BCD Code (iii) Excess -3 Code	5M	CO1	Apply
	b)	Explain about Non- weighted codes with examples.	5M	CO1	Understand
		(OR)			
2.	a)	Describe the binary number 1010 in (i) Gray code (ii) Octal code (iii) Hexa decimal code	5M	CO1	Understand
	b)	Calculate 1's and 2's complements of the following binary numbers (i) 11000 (ii) 10010 (iii) 11110	5M	CO1	Apply
		UNIT-II			
3.	a)	Solve the following Boolean expression to a minimum number of literals. (i) F = AB'C'D' + BCD' +BC'D'+BC'D (ii) F= (x+y) [x'(y'+z')]' + x'y' + x'z'	5M	CO2	Apply
	b)	Solve F(w,x,y,z)= Σ(1,2,4,5,8,10,14,15) & d(0,7,12) using K Map and write the simplified output expression.	5M	CO2	Apply
		(OR)			
4.	a)	Implement Exclusive OR gate using Universal Gates.	5M	CO2	Apply
	b)	Solve the following Boolean function using four-variable map. F(w,x,y,z)= Σ(0,1,2,4,5,7,9,11,14) & d(3,6,15)	5M	CO2	Apply
		UNIT-III			
5.	a)	Design Full Adder using two Half Adders and OR gate.	5M	CO3	Create
	b)	Design a 4 Bit Binary Adder.	5M	CO3	Create
		(OR)			
6.	a)	Design Gray to Binary code converter.	5M	CO3	Create
	b)	Design 4-bit binary Subtractor.	5M	CO3	Create
		UNIT-IV			
7.	a)	Design BCD to decimal decoder.	5M	CO4	Create
	b)	Design 2-bit Magnitude Comparator.	5M	CO4	Create
		(OR)			
8.	a)	Explain Encoders and Demultiplexers with example.	5M	CO4	Understand
	b)	Develop the function F=∑ (1, 3, 4, 11,12,13,14,15) using Multiplexer.	5M	CO4	Create
		UNIT-V			
9.	a)	Differentiate PROM, PLA and PAL	5M	CO5	Understand
	b)	Design 3- bit binary to gray code converter using ROM.	5M	CO5	Create
		(OR)			
10.	a)	Implement f (A, B, C, D) = ∑ (1,2,4,8,9,10) using PLA	5M	CO5	Apply
	b)	Implement f (A, B, C, D) = ∑ (0,1,2,3,5,6,7,9,11,15) using PAL.	5M	CO5	Apply
		UNIT-VI			
11.	a)	Explain JK Flip-flop and convert SR flip-flop to JK.	5M	CO6	Understanding
	b)	Design a MOD 7 Synchronous Counter using Flipflop?	5M	CO6	Create
		(OR)			
12.	a)	Explain Bi Directional shift register with logic diagram.	5M	CO6	Understand
	b)	Design 3- bit Ripple counter.	5M	CO6	Create

AR18

CODE: 18CET205 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June-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.		Explain in detail about various characteristics of good aggregates.	12M
		(OR)	
2.		What is fineness modulus? Explain its significance? How is sieve analysis conducted for Fine aggregate?	12M

UNIT-II

3.	a)	Explain the effect of water-cement ratio on strength of concrete.	6M
	b)	Draw graphs showing the variation of strength and workability with change in water- cement ratio.	6M
		(OR)	
4.	a)	What happens when unsound materials are used in concrete preparation?	6M
	b)	Write the steps involved in preparation of concrete?	6M

UNIT-III

5.		Name the different types of tests conducted on concrete samples and explain them briefly	12M
		(OR)	
6.	a)	Write a short note on Modulus of elasticity & dynamic modulus of elasticity.	6M
	b)	Write a short note on Poisson's ratio and creep of concrete.	6M

UNIT-IV

7.		Design a M20 mix for severe environment conditions and the minimum slump required is 120mm.The specific gravity of Coarse (20mm) and Fine (Zone-1) aggregates are 2.6 and 2.68 respectively.	12M
		(OR)	
8.	a)	Elaborate Mix design of concrete and factors affecting it.	8M
	b)	Explain the importance of maximum water-cement ratio and minimum cement content in Mix design.	4M

UNIT-V

9.		Define self-compacting concrete and explain its applications.	12M
		(OR)	
10.	a)	Write short notes on No-Fines Concrete	6M
	b)	Write short note on Polymer concrete	6M

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AR18

CODE: 18BST204 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June, 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) Define analytic function. Prove that the function defined by $f(z)=\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}(z\neq 0),\ f(0)=0$ is continuous and the Cauchy Riemann equations are satisfied at the origin yet $f'(0)$ does not exist — 6M

   b) If *f(z)* is an analytic function of *z*, Prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\left|Rf(z)\right|^2=2\left|f'(z)\right|^2$ — 6M

(OR)

2. a) Show that $u=\frac{1}{2}\log(x^2+y^2)$ is harmonic and find its harmonic conjugate function. — 6M

   b) Determine the analytic function *f(z) = u+iv* if $u+v=\frac{2\sin 2x}{e^{2y}-e^{-2y}-2\cos 2x}$. — 6M

UNIT-II

3. a) Evaluate $\oint_C \frac{\log z}{(z-1)^3}dz$ where C is $\left|z-1\right|=\frac{1}{2}$ using Cauchy's integral formula. — 6M

   b) Evaluate $\oint_C \frac{\cos \pi z}{z^2-1}dz$ around a rectangle with vertices $2\pm i,\ -2\pm i$ using Cauchy's integral formula. — 6M

(OR)

4. a) Construct Laurent's series about $z=1$ for $f(z)=\frac{e^{2z}}{(z-1)^3}$ — 6M

   b) Determine the poles of the function $f(z)=\frac{z^2-2z}{(z+1)^2(z^2+4)}$ and the residue at each pole — 6M

UNIT-III

5. a) If 0.8% of the fuses delivered to an arsenal are defective, use Poisson distribution to determine the probability that 4 fuses will be defective in a random sample of 400. — 6M

   b) The burning time of an experimental rocket is a random variable having the normal distribution with mean 4.6 seconds and standard deviation 0.04 seconds. What is the probability that this kind of rocket will burn (i) less than 4.66 seconds (ii) more than 4.80 seconds (iii) anywhere from 4.70 to 4.82 seconds. — 6M

(OR)

6. A test of five similar coins is tossed 320 times and hence the result is 12M

No. of heads:	0	1	2	3	4	5
Frequency:	6	27	72	112	71	32

Would you say that the coins are unbiased on the basis of Chi-square test at 0.05

UNIT-IV

7. a) A random sample of 100 recorded deaths in a country showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance. 6M

   b) To test the claim that the resistance of electric wire can be reduced by more than 0.050 ohm by alloying. 32 values obtained for a standard wire yielded $\bar{x}_1 = 0.136\text{ohm}, S_1 = 0.004\text{ohm}$ and 32 values obtained for alloyed wire yielded $\bar{x}_2 = 0.083\text{ohm}, S_2 = 0.005\text{ohm}$. Does this data support the claim at 0.05 level of significance? 6M

(OR)

8. a) A sample of 400 individuals is found to have a mean height of 67.47 inches. Is it reasonable to regard the sample drawn from the large population with mean height 67.39 inches and standard deviation of 1.3 inches. Test at 1% level of significance. 6M

   b) The means of two large samples of sizes 1000 and 2000 are 67.5 and 68 respectively. Test the equality of means of the two populations each with S.D 2.5 at 5% level of significance. 6M

UNIT-V

9. a) Fit of a parabola of second degree to the following data 6M

x:	0	1	2	3	4
y:	1	1.8	1.3	2.5	6.3

   b) For the data given below, find a equation to the best fitting exponential curve of the form $y = a\, e^{b\,x}$ 6M

x:	1	2	3	4	5	6
y:	1.6	4.5	13.8	40.2	125	300

(OR)

10. a) Ten people of various heights as under were requested to read the letters on a car at 25 yards distance. The number of letters correctly read is given below. 6M

Height in feet	5.1	5.3	5.6	5.7	5.8	5.9	5.10	5.11	6.0	6.1
No. of letters	11	17	19	14	8	15	20	6	8	12

   Is there any correlation between heights and visual power?

   b) For a set of values of x and y, the two regression lines are 31x-37y+5 = 0 and 50x-36y-612 = 0. Identify the regression line y on x and that of x on y. Also obtain the values of $\bar{x}$, $\bar{y}$ *and* r. 6M

AR18

CODE: 18EST206 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech I Semester Supplementary Examinations, June, 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 following i. $(378.93)_{10}$ to Octal ii. $(1000010101)_2$ to Decimal number iii. $(3A7)_{16}$ in to Decimal number.		6M
	b)	Calculate 1's and 2's complements of the following binary numbers (i) 11000 (ii) 10010 (iii) 11110		6M
		(OR)		
2.	a)	i. Obtain the dual of the Boolean expression AB+A (B+C) + B' (B+D). ii. Reduce the Boolean expression. B'C'D+(B+C+D)+B'C'D'E		6M
	b)	Realize the XOR gate using NOR logic.		6M
		UNIT-II		
3.	a)	Derive the canonical SOP for f(a,b,c,d)=a′b+ab′d+c′d		4M
	b)	Minimize the given function using K-Map method. F (A, B, C, D) = ∑m (0, 2, 4, 6, 7, 8, 10, 12, 13, 15).		8M
		(OR)		
4.	a)	Design a Half and full subtractor circuit with basic gates.		6M
	b)	Draw the logic diagram of Ripple Adder/Subtractor and explain its operation		6M
		UNIT-III		
5.	a)	Design a 3 to 8 decoder using 2 to 4 decoder and other required gates.		4M
	b)	Realize the logic expression of f (A,B,C,D) = ∑(0,1,3,5,6,8,9,11,12,13) using 16:I MUX, explain its procedure.		8M
		(OR)		
6.	a)	Explain the design procedure for multiplexers and de-multiplexers and draw the logic diagram of a 4-to-1 line multiplexer with logic gates.		6M
	b)	What is a comparator? Design a combinational circuit for a 2-bit magnitude comparator.		6M
		UNIT-IV		
7.	a)	Implement F (A,B,C,D) = Σ(0,1,4,5,6,7,9,10,12,13,15) using PAL and explain its procedure.		6M
	b)	Implement 4 bit binary to gray code conversion logic functions in PLA.		6M
		(OR)		
8.	a)	Implement the following Boolean functions using PLA with 3 AND gates. F1 (ABC) = Σ (3, 5, 7), F2 = Σ(4,5,7).		6M
	b)	Give the logic implementation of a 32 × 4 bit ROM using decoder of a suitable size.		6M
		UNIT-V		
9.	a)	Differentiate between Combinational and sequential circuits.		4M
	b)	Design a Mod-6 synchronous counter using J-K flip flops.		8M
		(OR)		
10.	a)	Explain the operation of Johnson counter and draw the logic circuit of the same using JK flip-flop.		6M
	b)	Explain the procedure in detail for converting D flip-flop into SR flip-flops		6M

AR16

CODE: 16ME2008 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June-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) The dynamic viscosity of oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm. **7M**

   b) Explain briefly the working principle of Bourdon Pressure Gauge with a neat sketch. **7M**

(OR)

2. a) Distinguish between : **7M**
   (i) Compressible and incompressible flow,
   (ii) Rotational and irrotational flow,
   (iii)Laminar and turbulent flow.

   b) The following cases represent the two velocity components, determine the third component of velocity such that they satisfy the continuity equation: **7M**
   (i) $u = x^2 + y^2 + z^2$; $v = xy^2 - yz^2 + xy$
   (ii) $v = 2y^2$, $w = 2xyz$.

UNIT-II

3. a) Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.8 N/cm^2. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s. **7M**

   b) State Bernoulli's theorem. Mention the assumptions made. How is it modified while applying in practice? List out its engineering applications. **7M**

(OR)

4. a) Define an orifice-meter. Prove that the discharge through an orifice-meter is given by the relation. **7M**
   where a_x = area of pipe in which orifice-meter is fitted
   a_0 = area of orifice

   b) A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to inlet and throat is 10 cm of mercury. Determine the rate of flow. Take C_d = 0.98. **7M**

UNIT-III

5. a) Obtain an expression for the velocity distribution for turbulent flow in smooth pipes. **7M**

   b) Determine the wall shearing stress in a pipe of diameter 100 mm which carries water. The velocities at the pipe centre and 30 mm from the pipe centre are 2 m/s and 1.5 m/s respectively. The flow in pipe is given as turbulent. **7M**

(OR)

6. a) Show lhat the force exerted by a jet of water on an inclined fixed plate in the direction of the jet is given by, $F_x = paV^2 \sin^2\Theta$. **6M**

   b) A jet of water of diameter 25 mm strikes a 20 cm x 20 cm square plate of uniform thickness with a velocity of 10 m/s at the center of the plate which is suspended vertically by a hinge on its top horizontal edge. The weight of the plate is 98.1 N. The jet strikes normal to the plate. What force must be applied at the lower edge of the plate so that plate is kept vertical? If the plate is allowed to deflect freely, what will be the inclination of the plate with vertical due to the force exerted by jet of water? **8M**

UNIT-IV

7. a) The penstock supplies water from a reservoir to the Pelton wheel with a gross head of 500 m. One third of the gross head is lost in friction in the penstock. The rate of flow of water through the nozzle fitted at the end of the penstock is 2.0 m /s. The angle of deflection of the jet is 165°. Determine the power given by the water to the runner and also hydraulic efficiency of the Pelton wheel. Take speed ratio = 0.45 and $C_v = 1.0$. **6M**

   b) Define the term 'Governing of a turbine*. Describe with a neat sketch the working of an oil pressure governor. **8M**

(OR)

8. a) Define the terms hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine. **6M**

   b) A reaction turbine works at 500 r.p.m. under a head of 100 m. The diameter of turbine at inlet is 100 cm and flow area is 0.35 m. The angles made by absolute and relative velocities at inlet are 15° and 60° respectively with the tangential velocity. Determine: (i) The volume flow rate, *(ii)* The power developed, and *(iii)* Efficiency. Assume whirl at outlet to be zero. **8M**

UNIT-V

9. a) Differentiate between the volute casing and vortex casing for the centrifugal pump. **7M**

   b) A centrifugal pump is to discharge 0.118 m /s at a speed of 1450 r.p.m. against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller. **7M**

(OR)

10. a) Explain the principle and working of a double acting reciprocating pump with a neat sketch. **7M**

    b) A double-acting reciprocating pump, running at 40 r.p.m., is discharging 1.0 m of water per minute. The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery and suction head are 20 m and 5 m respectively. Find the slip of the pump and power required to drive the pump. **7M**

AR16

CODE: 16EC2011 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, June-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)	Realise AND, OR, NOT, EX OR, NAND using NOR?	7M
	b)	Calculate 1's and 2's complements of the following binary numbers (i) 11000 (ii) 10010 (iii) 11110	7M
		(OR)	
2.	a)	List any seven Boolean theorems and prove them.	7M
	b)	Convert the following numbers with the given radix to decimal (i) $12.45_{(8)}$ (ii) $CS.2_{(16)}$ (iii) $121_{(3)}$	7M

UNIT-II

3.	a)	Simplify using four variable K Map, F= π (4, 6, 10, 12, 13, 15) and write the simplified expression.	7M
	b)	Design Ripple adder and explain its operation with an example.	7M
		(OR)	
4.	a)	Simplify F= $\sum$ (0, 1, 4, 5, 6, 7, 9, 11, 13) + d (10, 14) using four variable K Map and obtain the simplified expression?	7M
	b)	Design Full subtractor using half subtractors?	7M

UNIT-III

5.	a)	Design a BCD to seven segment Decoder?	7M
	b)	Design a four-bit gray to binary code convertor?	7M
		(OR)	
6.	a)	Design a three-bit Magnitude Comparator and explain its operation.	7M
	b)	Implement the function F=$\sum$ (0, 1, 3, 4, 8, 9, 15) using 16:1 Multiplexer.	7M

UNIT-IV

7.	a)	Realize the following switching function using PLA F(A,B,C,D)=$\sum$m(0,1,3,4,5,6,7,12,13).	7M
	b)	Explain in detail about working of PROM and PAL with neat diagrams?	7M
		(OR)	
8.	a)	Design a Binary to BCD code converter using a) PROM b) PLA	14M

UNIT-V

9.	a)	Convert T to SR and JK flipflops?	7M
	b)	Design a Decade synchronous counter using JK Flipflops?	7M
		(OR)	
10.	a)	Design a MOD 8 asynchronous down counter using T Flipflops?	7M
	b)	Elaborate in detail about the operation of ring counter with its truth table and neat diagram?	7M

AR13

CODE: 13BS2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, June-2022
COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to CIVIL & MECH)

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

PART-A

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

1. a) The necessary and sufficient conditions for the function $w = f(z) = u(x, y) + iv(x, y)$ to be analytic in a region R are
   b) Any function $\phi(x, y)$ is called a harmonic if it satisfies -------
   c) Write the statement of Cauchy's Integral theorem
   d) If $f(z) = \dfrac{1-\cos z}{z}$, then the nature of the singularity $z = 0$ ---------
   e) If $f(z) = \dfrac{ze^z}{(z+2)^4(z-1)}$ then the residue at the pole $z = 1$ is -------
   f) Explain about invariant points
   g) Find the value of $P\left(\dfrac{B}{A}\right)$ for the values $P(A) = \dfrac{1}{3}$, $P(B) = \dfrac{1}{4}$, $P(A \cup B) = \dfrac{1}{2}$.
   h) Mean and variance of a Poission distribution are ------, --------
   i) Write the formula for the standard error of sample mean
   j) Mention the main steps to test given hypothesis

PART-B

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

UNIT-I

2. a) Find the analytic function, whose real part is $\dfrac{\sin 2x}{\cosh 2y - \cos 2x}$ 6M

   b) Evaluate $\oint_C \dfrac{3z^2 + z}{z^2 - 1} dz$. Where C is the circle $|z-1| = 1$ 6M

(OR)

3. Show that the function $u(x,y) = e^{-x}(x \sin y - y \cos y)$ is harmonic. Determine its harmonic conjugate $v(x,y)$ and hence find an analytic function $f(z) = u + iv$ 12M

UNIT-II

4. a) Find the Laurents series expansion of $f(z) = \dfrac{e^{2z}}{(z-1)^3}$ about z = 1 6M

   b) Using residue theorem, evaluate $\oint \dfrac{z-3}{z^2+2z+5} dz$ where C is the circle $|z+1-i| = 2$ 6M

(OR)

5. Show that $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta} = \frac{2\pi}{\sqrt{3}}$. 12M

UNIT-III

6. a) Under the transformation $w = \frac{1}{z}$ find the image of the circle $|z - 2i| = 2$. 6M

b) Find the bilinear transformation which maps the points $z = -1, i, 1$ onto the points $w = 0, i, \infty$. 6M

(OR)

7. a) Show that the transformation $w = z + \frac{1}{z}$, maps the circles "$r =$ constant" in the z-plane are transformed into a confocal ellipses in w-plane. 6M

b) Find the bilinear transformation which maps the points (-1, 0, 1) in to the points (0, i, 3i). 6M

UNIT-IV

8. Show that mean= median = mode in a normal distribution. 12M

(OR)

9. a) A random sample of size 64 is taken from an infinite population having the mean 45 and the standard deviation 8. What is the probability that x will be between 46 and 47.5. 6M

b) A population consists of six numbers 4, 8, 12, 16, 20, 24. Consider all possible samples of size two that can be drawn without replacement from this population. Find (i) the population mean (ii) the population standard deviation (iii) the mean of the sampling distribution of means 6M

UNIT-V

10. a) Write the procedure for testing of hypothesis 6M

b) Samples of two types of electric light bulbs were tested for length of life and the following data were obtained 6M

Type-I	Type-I
Sample number n_1=8	Sample number n_2=7
Sample mean is 1234 hours	Sample mean is 1036 hours
Sample S.D is 36 hours	Sample S.D is 40 hours

Is the difference in the means sufficient to warrant that type-I is superior to type-II regarding length of life

(OR)

11. a) Samples of students were drawn from two universities and from their weights in kilograms, mean and standard deviations are calculated and shown below. Make a large sample test to test the significance of the difference between the means. 6M

	Mean	S.D	Size of the sample
University A	55	10	400
University B	57	15	100

b) A random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad. Find the percentage of bad pineapples in the consignment. 6M

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AR13

CODE: 13EC2006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, June-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) Calculate 1's and 2's complements of the following binary numbers (i) 11000 (ii) 10010 (iii) 11110 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 grouping cells for 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. 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. 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. 6
    b) Explain the operation of ring counter with its truth table and neat diagram? 6

(OR)

11. a) Draw the circuit diagram of Johnson counter using D- Flip Flops. 6
    b) Write the characteristic, Excitation tables for JK and T Flip Flops. 6

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