AR16

CODE: 16CE2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular & Supplementary Examinations, Nov / Dec-2018

ENVIRONMENTAL ENGINEERING-I
(Civil Engineering)

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

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

UNIT-I

1. a) What is meant by fire demand? Write the empirical formulas to calculate fire demand. 7M
   b) Write the drinking water standards according to IS 10500 7M

(OR)

2. a) What are the factors effecting Per Capita Demand explain in detail. 7M
   b) What are the different types of forecasting methods? Explain in detail. 7M

UNIT-II

3. a) What are the different points should be kept in mind while selecting a site for intake. 7M
   b) Explain about infiltration galleries with neat sketch in detail. 7M

(OR)

4. a) Ex plain Hardy Cross and equivalent pipe methods along with advantages and disadvantages. 7M
   b) Explain importance and working of Scour valves and check valves in distribution system with neat sketch. 7M

UNIT-III

5. a) What are the various units in water treatment plan Explain object of each unit. 7M
   b) What is meant by coagulant dosage? Explain the Jar Test procedure to determine coagulant dosage 7M

(OR)

6. a) What are the different coagulants used for coagulation? Explain along with advantages and disadvantages 7M

   b) Calculate size of a rectangular sedimentation tank to treat10 million litres of raw water per day. Assume surface over flow rate 25000 l/day/m^2 and detention period 2.5 hr. 7M

UNIT-IV

7. a) What are the troubles in rapid sand filters? Explain in detail. 7M

   b) What do you understand by break point chlorination? Explain with neat sketch. 7M

(OR)

8. a) Explain working of rapid sand filters with neat sketch in detail. 7M

   b) What is meant by chlorination? Explain types of chlorination in detail. 7M

UNIT-V

9. a) How do you classify the Municipal Solid Waste? Explain the characteristics of the various components. 7M

   b) Explain about energy recovery of solid waste in detail. 7M

(OR)

10. a) What is meant by incineration? When Incineration is used in solid waste disposal? Explain in detail. 7M

    b) Explain reduce reuse and recycling of solid waste in detail. 7M

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AR16

CODE: 16ME2008 **SET-1**

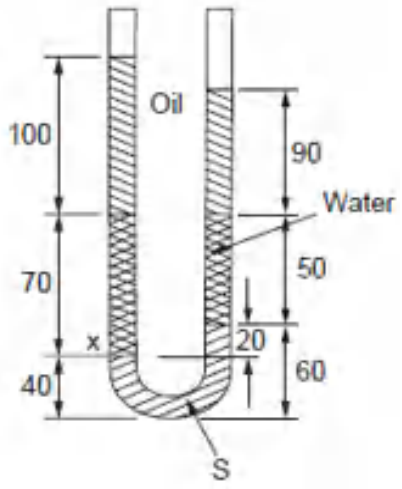
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular & Supplementary Examinations, Nov / Dec-2018
FLUID MECHANICS AND HYDRAULIC MACHINERY
(Common to EEE & ME)

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) Find the relationship between a and b if in steady flow $u = bx$ and $v = ay$, [5]
   b) A U-tube is filled first with a fluid of unknown density. Over this water is filled to depths as in figure. Lubricating oil of specific gravity 0.891 is filled over the water column on both limbs. The top of both limbs are open to atmosphere. Determine the density of the unknown fluid (dimensions in mm). [9]



(OR)

2. a) Define stream line, path line, streak lines and Stream tube. [5]
   b) Explain steady and unsteady flow, uniform and non-uniform, rotational and irrotational, compressible and incompressible. [9]

UNIT-II

3. a) Derive discharge for venturi meter with neat sketch. [7]
   b) Derive Euler's equation of motion and state the assumptions involved. [7]

(OR)

4. a) Explain the working of pitot tube with a neat sketch and state its applications. [7]

   b) A 60^0 bend in a horizontal pipe has its cross sectional area at inlet and outlet equal to 1 m^2 and 0.5 m^2 respectively. Calculate the magnitude and direction of the force required to hold the bend in position if the velocity of water at inlet is 10 m/s and pressure at inlet and outlet are 40 kN/m^2 and 30 kN/m^2 respectively. [7]

UNIT-III

5. a) A jet of water of 80 mm diameter strikes a curved vane at the centre with a velocity of 40 m/sec. The curved vane is moving with a velocity of 6m/sec in the direction of the jet. Find the force exerted on the plate in the direction of the jet, power and efficiency of the jet. Assume that the plate is smooth. [7]

   b) Two pipes of 0.35m and 0.25m dia and length 2000m and 1500m with f values 0.021 and 0.018 connected is series carry water from a reservoir to a supply system, the head available being 8m. Determine the flow quantity neglecting minor losses. [7]

(OR)

6. a) A pipe line 200 mm dia. and 4000 m long connects two reservoirs with a difference in level of 60 m. Water is drawn at 1500 m point at a rate of 50 lit/s. Friction coefficient $f = 0.024$. Determine the flow rates in the two sections. Neglect minor losses [7]

   b) Determine the diameter of the pipe (smooth) required conveying 150 lit of kerosene over a length 1000 m with the loss of head by friction limited to 10 m of kerosene. Density = 810 kg/m^3, kinematic viscosity = 2.37×10^{-6} m^2/s [7]

UNIT-IV

7. a) Explain the function of draft tube in the case of reaction turbines. [5]

   b) The outer diameter of a Francis runner is 1.4 m. The flow velocity at inlet is 9.5 m/s. The absolute velocity at the exit is 7 m/s. The speed of operation is 430 rpm. The power developed is 12.25 MW, with a flow rate of 12 m^3/s. Total head is 115 m. For shockless entry determine the angle of the inlet guide vane. Also find the absolute velocity at entrance, the runner blade angle at inlet and the loss of head in the unit. Assume zero swirl at exit. Also find the specific speed. [9]

(OR)

8 a) What are the main differences between impulse and reaction turbines? [5]

   b) A small Francis turbine develops 2555 kW working under a head of 25 m. The overall efficiency is 0.9. The diameter and width at inlet are 1310 mm and 380 mm. At the outlet these are 1100 mm and 730 mm. The runner blade angle at inlet is 135° along the direction of the blade velocity. The whirl is zero at exit. Determine the runner speed, whirl velocity at inlet, the guide blade outlet angle and the flow velocity at outlet. Assume $\eta_v = 0.98$, $\eta_m = 0.97$. [9]

UNIT-V

9. a) What are the advantages of centrifugal pumps over reciprocating pumps? [5]

   b) A centrifugal pump running at 1450 rpm has an impeller diameter of 0.4 m. The backward curved blade outlet angle is 30° to the tangent. The flow velocity at outlet is 10 m/s. Determine the static head through which water will be lifted. In case a diffuser reduces the outlet velocity to 40% of the velocity at the impeller outlet, what will be the increase in the static head? [9]

(OR)

10. a) Explain why priming is necessary to start pumping by centrifugal pump. [5]

    b) A double acting reciprocating pump, running at 40 r.p.m is discharging 1.0m^3 of water per minute. The pump has s 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. [9]

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AR16

CODE: 16EE2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular & Supplementary Examinations, Nov / Dec-2018

LINEAR CONTROL SYSTEMS

(Electronics and Communication 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 Distinguish between open loop control system and closed loop control system. 6M
   b Obtain the Transfer Function for the Block-Diagram Shown below 8M

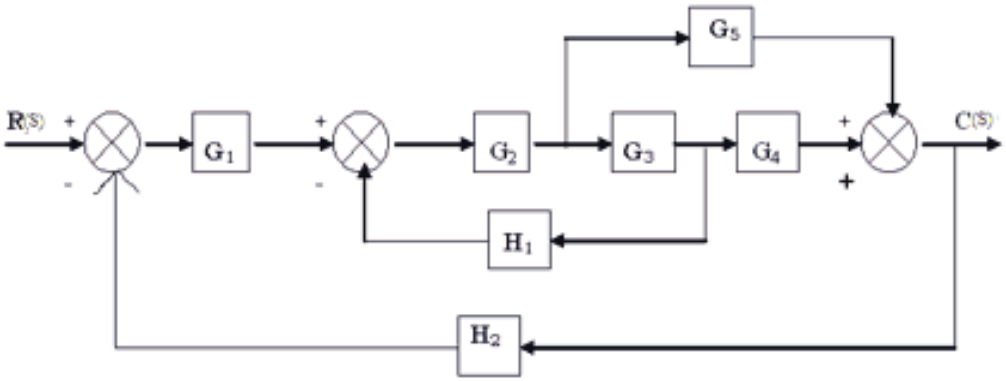

Fig.1

(OR)

2. a Distinguish between feedback control system and feed forward control system. 6M
   b For the signal flow graph shown in fig. 2, obtain the overall gain $\frac{c(s)}{r(s)}$. 8M

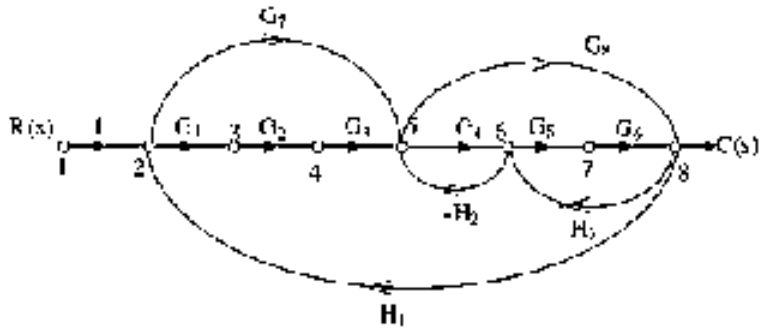

Fig.2

UNIT-II

3. a What is a synchro? Explain the construction and working of a synchro. 7M
   b For a unity feedback system with open loop transfer function 7M

$$G(s) = \frac{50}{(1+0.1s)(1+2s)}$$

Determine position, velocity and acceleration error constants

(OR)

4. a Derive the transfer function of a field controlled DC servo motor. 6M

b For a unity back system with open loop transfer function is given by, 8M

$$G(s) = \frac{20}{s(s+10)}$$

Determine: i) Maximum Overshoot ii) Rise Time iii) Settling Time iv) Steady state error if the input is a unit step.

UNIT-III

5. a The characteristic equation of a feedback control system is given by $s^3 + s^2 + (K+1)s + 3K = 0$ .Using RH Criterion find the range of K for which the system is stable. 7M

b Explain the steps for the construction of root locus. 7M

(OR)

6. a Define the following terms 6M
   i. Stable system
   ii. Critically stable system
   iii. Conditionally stable system.

b Sketch the root locus diagram for the unity feedback system having open-loop transfer function G(s), obtain the range of K for sustained oscillations. 8M
where

$$G(s) = \frac{K}{s(s+4)(s^2+4s+20)}$$

UNIT-IV

7. a Write a note on frequency domain specification 7M

b Show that in Bode magnitude plot the slope corresponding to a quadratic factor is ±40 dB/dec. 7M

(OR)

8. The Open loop transfer function of a unity feed-back control system is given by $G(s) = \frac{1000}{s(0.1s+1)(0.001s+1)}$. Draw the Bode plots from these plots determine gain margin and phase margin? 14M

UNIT-V

9. a Draw the circuit diagram of lead compensating network, obtain its transfer function 7M

b Derive the transfer function of a lag compensating network. Draw its pole zero plot. 7M

(OR)

10. a The state equation of a linear time-invariant system is given below: 7M

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

Determine the State transition matrix

b Compute X (t) for unit step input under zero initial condition. 7M

$$\dot{X} = \begin{bmatrix} -1 & 0 \\ 0 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

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AR16

Code No: 16CS2004 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular & Supplementary Examinations, Nov / Dec-2018
OBJECT ORIENTED PROGRAMMING
(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 -1

1. a. What is Procedural Programming Paradigm? Compare it with Object Oriented Programming Paradigm. 7M
   b. Explain different data types with suitable examples. 7M

(OR)

2. a. Explain i) Function Prototyping
   ii) Call by Reference 8M
   b. Explain different types of expressions in C++. 6M

UNIT – II

3. a. Explain static data members and static member functions with example. 6M
   b. Derive a class to represent a bank account with the data members Name of the Depositor, Account No, Type of account, Balance amount in the account and member functions to assign initial values,to deposit an amount, to withdraw an amount after checking the balance,to display name and balance. 8M

(OR)

4. a. Define operator overloading. Explain overloading on unary and binary operators. 7M
   b. Explain briefly type conversions. 7M

UNIT – III

5. a. Define Inheritance. Explain Multilevel Inheritance with example. 7M
   b. What are abstract Classes? Explain with example. 7M

(OR)

6. a. Explain single and multiple Inheritance with example. 7M
   b. Explain about the constructors in derived classes. 7M

UNIT – IV

7. a. Differentiate Virtual Functions and Pure Virtual Functions and give examples. 7M
   b. Explain static and dynamic binding with example. 7M

(OR)

8. a. Explain the need of pointers in C++. Explain with small example program. 7M
   b. Explain Virtual Constructors with examples. 7M

UNIT – V

9. a. Discuss Function Templates with examples. 7M
   b. Explain exception handling mechanism in C++. 7M

(OR)

10. a. Explain briefly overloading of template functions. 7M
    b. Explain about file stream classes. 7M

CODE: 13BS2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, Nov / Dec-2018

COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to CE & ME)

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

PART-A

Answer all questions **[1 X 10 = 10 M]**

1. a) State Cauchy – Riemann Equations in polar co-ordinates?
   b) Show that f(z) = z+2$\bar{z}$ is not analytic anywhere in the complex plane?
   c) Find real and imaginary parts of sin z?
   d) Find the poles of $f(z)=\frac{e^z}{(z-1)^2}$?
   e) Find the poles and Residues of $\int_c \frac{\cos \pi z^2}{(z-1)(z-2)}dz$ where c is |z| = $\frac{3}{2}$
   f) If P(A) = 1/3,P(B) = 1/4, P(A$\cap$ B) = 1/12 ,then find P(B/A)?
   g) Write the conditions of Poisson distribution?
   h)What is the relation between mean ,median and mode of normal distribution?
   i) Find $F_{0.05}$ for v_1 = 15 and v_2 = 7.
   j) What is the formula for maximum error for large samples?

PART-B

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

UNIT-I

2. a) Show that the function u = 2 log ($x^2 + y^2$) is harmonic and find its harmonic conjugate?
   b) Find most general analytic function whose real part is u = $x^2 - y^2 - x$? [6M+6M]

(OR)

3. a) Evaluate $\int_{(0,0)}^{(1,1)} (3x^2+4xy+ix^2)dz$ along $y = x^2$.
   b) Using Cauchy's integral formula, evaluate $\int_c \frac{e^{2z}dz}{(z+1)^4}$ around c : |z-1| = 3. [6M+6M]

UNIT-II

4. a) Find the poles of f(x) = $\frac{e^{3z}}{(z-1)^4}$.
   b) Evaluate $\int_c \frac{dz}{(z^2+4)^2}$ where c is the circle |z-i| = 2 using Cauchy's residue theorem. [6M+6M]

(OR)

5. a) Evaluate the integral over a unit circle c, $\int_c \frac{(2z+1)^2}{(4z^3+z)}dz$.
   b) Show that $\int_0^{2\pi} \frac{d\theta}{a+b\cos\theta} = \frac{2\pi}{\sqrt{a^2-b^2}}$ where a>b>0. [6M+6M]

CODE: 13BS2007

UNIT-III

6 a) Find the bilinear transformation which maps the points (1,i,-1) in to the points $(0,1,\infty)$

b) Explain the transformation $w = z + \frac{a^2}{z}$. [6M+6M]

(OR)

7. Prove that under the transformation $w = \frac{1}{z}$ the image of lines y = x-1 and y = 0 are the circle $u^2 + v^2 - u - v = 0$? [12M]

UNIT-IV

8. a) In a factory, machine A produce 40% of the output and machine B produce 60%.On the Average, 9 items in 1000 produced by A are defective and 1 item in 250 produced by B is Defective. An item is drawn at random from a day's output is defective. What is the Probability that it was produced by A?

b) Assume that 50% of all Engineering students are good in Mathematics. Determine the probability that among 18 engineering students (i) exactly 10 (ii) at least 10. [6M+6M]

(OR)

9. a) A research worker wants to determine the average time it takes a mechanic to rotate the Tyres of a car and he wants to be able to assert with 95% confidence that the mean of his sample is off by atmost 0.5min., If he can presume from the past experience that $\sigma = 1.6$ min., how large a sample will have to take?

b) A random sample of 100 teachers in a large metropolitan area revealed a mean weekly salary of Rs.487 with a standard deviation Rs.48.With what degree of confidence can we assert that the average weekly salary of all teachers in the metropolitan area is between 472 to 502? [6M+6M]

UNIT-V

10. a)In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers?

b)A sample of 26 bulbs gives a mean life of 990 hours with a S.D. of 20 hours . The manufacturer claims that the mean life of bulbs is 1000 hours . Is the sample not up to the standard? [6M+6M]

11. From the following data , find whether there is any significant liking in the habit of Taking soft drinks among the categories of the employees.

EMPLOYEES

Soft drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thums up	15	30	65
Fanta	0	60	30

[12M]

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AR13

CODE: 13ME2008 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, Nov / Dec-2018
FLUID MECHANICS & HYDRAULIC MACHINES
(Electrical & Electronics Engineering)

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

PART-A

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

1. a) Define specific gravity
   b) Define surface tension
   c) Classify steady and unsteady flows
   d) List out the examples for Surface forces
   e) Define Reynold's Number
   f) Define Hydraulic gradient line
   g) Define specific speed of a turbine
   h) Distinguish between impulse and reaction turbines.
   i) What are the functions of a draft tube?
   j) How the pumps are to be connected if (i) discharge is to be increased (ii) head is to be increased?

PART-B

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

UNIT-I

2. A body weighing 450N with a flat surface area of 0.033m^2 slides down lubricated inclined plane making a 30^o angle with horizontal. For viscosity of 0.2 N-s/m^2 and body speed of 3 m/s, determine the lubricant film thickness — 12M

(OR)

3. a) What is a manometer ? How they are classified? — 6M
   b) The pressure intensity at a point in a fluid is given by 3.924 N/cm^2. Find the corresponding height of fluid when the fluid is : (a) water , and (b) oil of specific gravity 0.9 — 6 M

UNIT-II

4. a) Describe stream lines, streak line and path lines 6M
   b) Determine whether the following velocity component satisfy the possibility of flow or not $u = cx, v = -cy$ 6M

(OR)

5. The Water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through the pipe is 35 litres /sec. The section 1 is 6m above the datum and section 2 is 4 m above the datum. If the pressure at section 1 is 39.24 N/cm^2, find the intensity of pressure at section 2 12M

UNIT-III

6. Derive Darcy Weishbach equation 12M

(OR)

7. 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 the inlet and the throat is 20 cm of mercury . Determine the rate of flow . Take Cd = 0.98 12M

UNIT-IV

8. a) List out the difference between impulse and reaction turbines 6M
   b) Draw the inlet and outlet velocity triangles for Pelton Wheel 6M

(OR)

9. a) Write the classification of turbines 6M
   b) A turbine develops 9000 kW power under a head of 30 metres at 140 r.p.m. Calculate the specific speed of the turbine 6M

UNIT-V

10. With a neat sketch explain the working of a centrifugal pump 12M

(OR)

11. A single - acting reciprocating pump has a piston diameter of 200 mm and stroke length of 300 mm. If the speed of the pump is 50 r.p.m. and it delivers 0.00736 m^3/sec of water against a suction head of 3.5 m and a delivery head of 11.5 m, find the theoretical discharge, coefficient of discharge, the slip, the percentage slip of the pump and the power required to drive the pump. 12M

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AR13

CODE: 13EC2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, Nov / Dec-2018
PROBABILITY THEORY & STOCHASTIC PROCESSES
(Electronics and Communication Engineering)

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

PART-A

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

1. a) Define conditional probability
   b) Define joint probability for two events
   c) Average number of accidents on any day in a city is 1.8. Determine $P(X \geq 1)$
   d) State the density function of Gaussian random variable
   e) Define statistically independent random variables
   f) Define joint characteristic function of two random variables
   g) Define second order stationary random process
   h) Define autocorrelation function of a random process
   i) Define power density spectrum
   j) Define thermal noise

PART-B

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

UNIT-I

2. a In a bolt factory, machines A, B and C manufacture 20%, 30% and 50% of the total of their output and respectively 6%, 3% and 2% are defective bolts. A bolt is drawn at random and is found to be defective. Determine the probabilities that it was manufactured by the machine B **6M**

   b If A and B are statistically independent events, prove that (i) A and $\overline{B}$ (ii) $\overline{A}$ and $\overline{B}$ are independent **6M**

(OR)

3. a A missile can be accidentally launched if two relays A and B both have failed. The probabilities of A and B failing are known to be 0.01 and 0.03 respectively. It is also known that B is more likely to fail (probability 0.06) if A has failed (a) What is the probability of an accidental missile launch (b) What is the probability that A will fail if B has failed **6M**

   b Let $B_1, B_2, \cdots B_n$ be mutually exclusive and exhaustive events of a sample space S and A be any event. Then prove that **6M**

$$P(B_i / A) = \frac{P(A/B_i)P(B_i)}{P(A/B_1)P(B_1) + P(A/B_2)P(B_2) + \cdots + P(A/B_n)P(B_n)} \text{ for}$$

$i = 1, 2, \cdots n$

UNIT-II

4. a A submarine attempts to sink an aircraft carrier. It will be successful only two or more torpedoes hit the carrier. If the submarine fires three torpedoes and the probability of a hit is 0.4 for each torpedo, what is the probability that the carrier will be sink? **6M**

   b A random variable X have a distribution function $F_X(x) = u(x)\left[1 - e^{\frac{-x^2}{b}}\right]$, **6M**

where $b > 0$ is a constant. Find its density function

(OR)

5. a Define distribution function and write its properties **6M**

b Find the probability of the event $\{X \le 7.3\}$ for a Gaussian random variable X having $a_X = 7$ and $\sigma_X = 0.5$ **6M**

UNIT-III

6. a A joint probability density function is $f_{X,Y}(x,y) = \begin{cases} \frac{1}{ab}, & 0<x<a \ \ and \ 0<y<b \\ 0 & elsewhere \end{cases}$ **6M**

Find (i) $F_{X,Y}(x,y)$ (ii) $P\left[X + Y \le \frac{3a}{4}\right]$ $for\ a<b$

b If the Joint sample space S has only three possible elements (1, 1), (2, 1) and (3, 3) and their probabilities be 0.2, 0.3 and 0.5, find the joint Distribution $F_{X,Y}(x,y)$ and the marginal distributions $F_X(x)$ and $F_Y(y)$ **6M**

(OR)

7. a Define joint density function and write its properties **6M**

b The joint distribution function for the two random variables X and Y is $F_{X,Y}(x,y) = u(x)u(y)[1 - e^{-0.5x} - e^{-0.5y} + e^{-0.5(x+y)}]$ where $u(\cdot)$ is the unit step function. Find i) P[X ≤ 1 , Y≤ 2] ii) P[0.5 < X < 1.5] **6M**

UNIT-IV

8. a Explain cross correlation of two random processes with properties **6M**

b A random process is defined by $Y(t) = X(t)\cos(\omega_0 t + \theta)$ where $X(t)$ is wide sense stationary random process that amplitude-modulates a carrier of constant angular frequency ω_0 with a random phase θ independent of $X(t)$ and uniformly distributed on $(-\pi, \pi)$. Determine $E[Y(t)]$ and autocorrelation of $Y(t)$ **6M**

(OR)

9. a Define random process and classify the random processes **6M**

b Given the autocorrelation function, for a stationary ergodic process with no periodic components, is $R_{XX}(\tau) = 25 + \frac{4}{1+6\tau^2}$. Determine the mean and variance of the process $X(t)$ **6M**

UNIT-V

10. a Write the properties of cross power density spectrum **6M**

b Determine the average power of the random process $X(t) = A_0\cos(\omega_0 t + \theta)$ where A_0 and ω_0 are constants and θ is a uniformly distributed random variable on $\left(0, \frac{\pi}{2}\right)$ **6M**

(OR)

11. a Derive relation between autocorrelation function and Power Density Spectrum. **6M**

b Compute the power spectrum of a random process $X(t)$, whose auto correlation function given by $R_{XX}(\tau) = 2\cos 3\tau$ **6M**

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AR13

CODE: 13CS2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, Nov / Dec-2018
ADVANCED DATA STRUCTURES
(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 rehashing?
   b) What is linear probing?
   c) Mention any two applications of red-black trees.
   d) Write any two advantages of AVL tree over Binary Search Tree.
   e) List some techniques that are used to implement Hash functions.
   f) What is the maximum number of nodes in an AVL tree of a given height h?
   g) Give any two applications of Binomial Queues.
   h) Define heap property.
   i) Give applications for pattern matching.
   j) Differentiate Binary Tries and Multiway Tries.

PART-B

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

UNIT-I

2. a) Illustrate various hashing functions with suitable examples. 6 M
   b) What is a dictionary? Write and explain various data structures that can be devised to realize a dictionary. 6 M

(OR)

3. a) What is a skip list? Provide the implementation details of insertion and deletion operations in a skip list. Use appropriate examples to support your answer. 6 M
   b) What is collision? Explain different collision resolution methods. 6 M

UNIT-II

4. Start with an empty AVL tree and insert the following keys in the given order: 20, 10, 5, 30, 40, 57, 3, 2, 4, 35, 25, 18, 22, 21. Draw the figures depicting your tree immediately after insertion and following the rebalancing rotation. From the tree delete keys 40, 2, 18 and 4. Draw the tree after each deletion. 12 M

(OR)

5. a) Define 2-3 Tree. Generate a 2-3 Tree for the following key values: 25,10,12,15,39,64,53. Explain each insertion. 6 M
   b) Write short notes on splay trees. 6 M

UNIT-III

6. a) Discuss the Dijkstra's single source shortest path algorithm and derive the time complexity of this algorithm. 6 M
   b) What is a Spanning tree? Explain Prim's Minimum cost spanning tree algorithm with suitable example. 6 M

(OR)

7. a) Write and describe the steps of Warshall's Algorithm. 6 M
   b) How to find shortest path between vertices using all pairs shortest path floyd's algorithm. 6 M

UNIT-IV

8. a) What is a binomial queue? Explain its operations. 6 M
   b) Perform heap sort with the following elements 84, 62,50, 42, 30, 52, 70 6 M

(OR)

9. a) Write an algorithm to insert an element in max heap. Trace the above algorithm for the following elements? 1, 2, 3, 4, 5, 6, 7, 8 6 M
   b) While creating the heap for above data, will the insertion algorithm fall in best case or worst case? Justify your answer? 6 M

UNIT-V

10. a) Give a brief description on pattern matching problem and explain Boyer-moore algorithm with an example. 6 M
    b) Explain the concepts of digital search trees. 6 M

(OR)

11. a) What is a binary tree? Construct a binary tree with elements: 0001, 0011, 1000, 1001, 1100, 0010, 1101, 1010. 6 M
    b) With the aid of suitable example, describe the Brute Force approach for pattern matching. 6 M

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