SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR

Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK

Subject with Code :Discrete Mathematics and Applications(19HS0841)

Course & Branch: M.Tech – CSE   **Year & Sem:** I-YEAR & I- SEM   **Regulation:R19**

UNIT – I

1. a) Define probability.   **[2M]**
   b) A five figure number is formed by the digits 0, 1,2,3,4 without repetition. Find the
   Probability that the number formed is divisible by 4.

2. a) Define Expectation, variance , mean deviation from mean .   **[6M]**
   b) If X is a continuous Random variable with probability density function given by

$$f(x) = kx , \quad 0 \le x < 2$$
$$= 2k , \quad 2 \le x < 4$$
$$= - kx + 6k , 4 \le x < 6 .$$

   Find the value of k and mean value of X.   **[6M]**

3. A pair of dice is tossed twice. Find the probability of scoring 7 points,
        (i) Once   **(ii)** at least once **(iii)** twice.   **[12M]**

4. The probability density function of a variate X is

X	0	1	2	3	4	5	6
P(X)	k	3k	5k	7k	9k	11k	13k

   (i) Find **P(X < 4), P(X ≥ 5) ,P(3 < X ≤ 6)**
   (ii) What will be the minimum value of k, so that **P (X ≤ 2) > 3 .**   **[12M]**

5. i) Is the function defined as follows a density function ?

$$f(x) = e^{-x} , x \ge 0$$
$$= 0 , \quad x < 0.$$ **[5M]**

ii) If so determine the probability that the variate having this density will fall in the
   Interval (1, 2)**?**   **[4M]**
iii) Also determine the cumulative probability function F (2).   **[3M]**

6. The frequency distribution of a measurable characteristic varying between 0 and 2 is as

$$f(x) = x^3 , \quad 0 \le x \le 1$$
$$= (2- x)^3 , \quad 1 \le x \le 2 .$$ Find the men value of x , P (0 < x < 1.5).   **[12M]**

7. a) state the central limit theorem   **[3M]**
   b) A sample of 900 members is found to have a mean of 3.4 cm. can it be reasonably regarded as
a truly random sample from a large population with mean 3.25 cm and standard deviation 1.61 cm
                                                                                                                              [9M]

8. a) The means of simple samples of sizes 1000 and 2000 are 67.5 cm and 68.0 Respectively, can the samples be regarded as drawn from the same population of standard deviation 2.5cm**?**   **[6M]**

 b) The mean of a certain normal population is equal to the standard error of the mean of the samples of 100 from that distribution. Find the probability that the mean of the sample of 25 from the distribution will be negative.   **[6M]**

9. a) Explain about markov chains with an example .   **[6M]**

  b) Define variance, mean standard deviation of discrete and continuous distribution, and conditional expectation with examples.   **[6M]**

10. A random variable X has the following probability function

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

Determine (i) K (ii) Evaluate $P(X<6)$, $P(X\geq6)$ and $P(0<X<5)$ (iii) if $P(X\leq K)>1/2$, find the minimum value of K   (iv) Determine the distribution function of X

 (v) Mean   (vi) variance.   **[12 M]**

UNIT II

1. Fit a straight line Y = a + bx to the following data by the method of moments.

X	1	2	3	4
Y	16	19	23	26

[12M]

2. Given the following data

X	0	1	2	3	4
Y	1	5	10	22	38

Find the parabola of best fit by the method of moments. **[12M]**

3. ...Use the method of moments to fit the straight line Y = a + b x to the data

X	1	2	3	4
Y	0.17	0.18	0.23	0.32

[12M]

4. Fit a parabola of the form $Y = a + bx + cx^2$ to the following data

X	1	2	3	4
Y	1.7	1.8	2.3	3.2

[12M]

5 .a) A die was thrown 9000 times and a throw of 5or 6 was obtained 3240times, on the assumption of random throwing, do the data indicate unbiased die. **[6M]**

b) In a locality containing 18000 families a sample of 840 families was selected at random. Of these 840 families, 206 families were found to have a monthly income of Rs .250 or less. It is desire to estimate how many out of 18000 families have a monthly income of Rs.250 or less, within what limits would you place your estimate? **[6M]**

6. a)In a city A , 20 % of random sample of 900 school boys had a certain slight physical defect. In another city B , 18.5 % of a random sample of 1600 boys had the same defect. Is the difference between the proportions significant? **[6M]**

b) The nine items of a sample have the following values : **45,47,50,52,48,47,49,53,51.** Does the mean of these differ significantly from the assumed mean of **47.5?** **[6M]**

7. a) In two large population there are 30% and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the tow population**. [6M]**

b) A machinist is make engine parts with angle diameter of 0.7 inch. A random sample of 10 parts shows mean diameter of 0.742 inch with a standard deviation of 0.04 inch. On the basis of this sample would you say that the work is inferior ? **[6M]**

8.a) A set of five similar coins is tossed 320 times and the result is

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

Test the hypothesis that the data follow a binomial distribution**. [8M]**

b) Define expectation, variance and moments? **[4M]**

9. Fit a Poisson distribution to the following data and test for its goodness of fit at level of

Significance 0.05

X	0	1	2	3	4
F(x)	419	352	154	56	19

[12M]

10. Fit a normal distribution to the following data of weights of 100 students of Delhi University and test the goodness of fit

Weights(kg)	60-62	63-65	66-68	69-71	72-74
Frequency	5	18	42	27	8

[12M]

UNIT III

1.(a) Enumerate the number of non-negative integral solutions to the inequality

$x_1 + x_2 + x_3 + x_4 + x_5 \leq 19$. [6M]

b) How many integral solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where each

(i) $x_i \geq 2$? (ii) $x_i > 2$? [6M]

2 a) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8 and 9 if no repetitions

are allowed? [6M]

b) How many different license plates are there that involve 1,2or 3 letters followed

by 4 digits ? [6M]

3. a) Out of 5 men and 2 women , a committee of 3 is to be formed . In how many ways

Can it be formed if at least one woman is to be included? [6M]

b) Find the number of arrangements of the letters in the word ACCOUNTANT. [6M]

4 a). The question paper of mathematics contains two questions divided into two

Groups of5questions each. In how many ways can an examine answer six questions

Taking atleast two questions from each group [6M]

b) How many permutations can be formed out of the letters of word " SUNDAY" ? How many of these (i) Begin with S? (ii) end with Y? (iii) begin with S & end with Y? (iv) S &Y always together ? [6M]

5 (a) In how many ways can the letters of the word COMPUTER be arranged? How many of them begin with C and end with R? How many of them do not begin with C but end with R? [6M]

b) Out of 9 girls and 15 boys how many different committees can be formed each

consisting of 6 boys and 4 girls? [6M]

6.a) Determine the number of edges in **(i)** Complete graph K_n

(ii) Complete bipartite graph $K_{m,n}$**(iii)** Cycle graph C_n

(v) Null graph N_n [6M]

b) Show that the maximum number of edges in a simple graph with n vertices is n (n-1) / 2 [6M]

**7. a)**Define isomorphism. Explain Isomorphism of graphs with a suitable example. [6M]

b) Explain graph coloring and chromatic number give an example. [6M]

8. a) Give an example of a graph that has neither an Eulerian circuit nor a Hamiltonian circuit [6M]

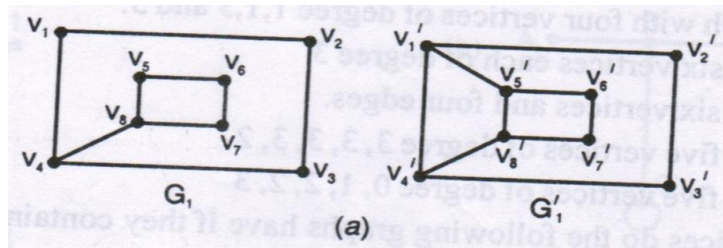**b)** Give an example of a graph which is Hamiltonian but not Eulerian and vice versa. [6M]

9. a) Show that the two graphs shown below are isomorphic ?   [6M]
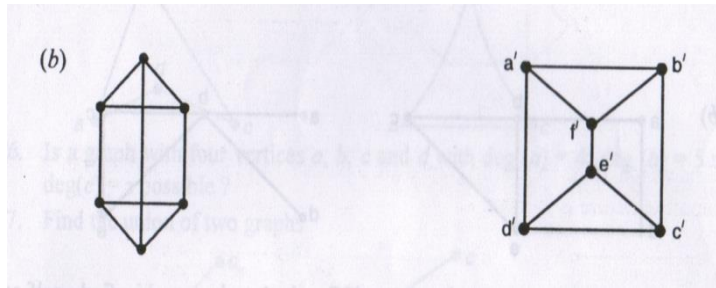
b) Is the following pairs of graphs are isomorphic or not ?   [6M]

10. a) Find the chromatic polynomial & chromatic number for K $_{3,3}$ [6M]

b) Define Euler circuit, Hamilton cycle, Wheel graph with examples?   [6M]

UNIT IV

1. Explain about TCP Model. What is the main difference between TCP and UDP? [12M]

2. Describe ISO-OSI Model with a near sketch. [12M]

3. Explain in detail about Software Development Life Cycle. [12M]

4. What is distributed systems? What are goals of distributed systems? [12M]

5. Describe about evolution of Software Engineering Methodologies. [12M]

6. Explain about distributed systems and list out the characteristics of distributed systems. [12M]

7. a) Explain about Virus, Worms and trojans. [6M]

   b) Explain about DoS and DDoS Attacks. [6M]

UNIT V

1. a) What is an Operating System? [3M]

   b) Explain about operating system debugging. [9M]

2. What is Bioinformatics? Explain with an example. [12M]

3. What is Machine learning and Deep learning? Write the difference between Machine learning and Deep learning. [12M]

4. Explain the following protocols

   a) TCP/IP [4M]

   b) ARP [4M]

   c) HTTP [4M]

5. What are different types of computer security threats? How to protect from them. [12M]

6. What is Bioinformatics? Explain with an example. [12M]

7. Explain about the recent trends in soft computing with examples. [12M]