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AY 24

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M.Tech. (First Semester) Regular Examinations, February – 2025

24MCSPC11001– Mathematical Foundations of Computer Science

(**Computer Science**)

Time: 3 hrs Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Define Continuous Probability distribution	CO1	K1
b. Find the expectation of number of tosses require when a coin is tossed until head appears or five tails occurs	CO2	K2
c. Define Rank of Correlation.	CO3	K2
d. Define Hamilton circuit.	CO4	K2
e. Difference between a Hamiltonian circuit and an Eulerian cycle.	CO5	K3

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions

		Marks	CO #	Blooms Level
2. a.	Let a pair of fair dice be tossed and let X denote the sum of the points obtained. Find the probability distribution and Cumulative Distribution function: a). F[$2 < x \leq 5$] b). F[$3 \leq x \leq 6$]	5	CO1	K2
b.	A random variable X has the following probability distribution **X: 0 1 2 3 4 5 6 7 8** **P(x): a 3a 5a 7a 9a 11a 13a 15a 17a** Determine i. Find a, ii. Find the Cumulative Distribution function, *iii.* $P(3 < X < 6)$	5	CO1	K3
	(OR)			
c.	Find the expectation of number of tosses require when a coin is tossed until tail appears or five head occurs	5	CO1	K2
d.	In commuting to work, a professor must first get on a bus near her house and then transfer to a second bus. If the waiting time (in minutes) at each stop has a uniform distribution with end , then it can be shown that the total waiting time "y" has the pdf $f(x) = \begin{cases} \frac{y}{25}, & 0 \leq y < 5 \\ \frac{2}{5} - \frac{y}{25} & 5 \leq y \leq 10 \\ 0, & y < 0 \text{ or } y > 10 \end{cases}$ i. What is the probability that total waiting time is between 3 and 8 min? ii. What is the probability that total waiting time is either less than 2 min or more than 6 min?	5	CO1	K3
3.a.	Out of 3000 families with 4 children each, how many would you expect to have (a) at least 1 boy, (b) 2 boys, (c) 1 or 2 girls, (d) no girls?	5	CO2	K3
b.	If X is a random variable such that $3P(X = 4) = \frac{1}{2}P(X = 2) + P(X = 0)$ Find Mean and $P(X = 3)$	5	CO2	K3

(OR)

c. The Pair of dice What is the probability of getting a total of 9 (a) twice and (b) at least twice in 6 tosses of a pair of dice? 5 CO2 K3

d. If the probability that an individual will suffer a bad reaction from injection of a given serum is 0.001, determine the probability that out of 2000 individuals, by Using Poisson distributed 5 CO2 K3

i. exactly 3,

ii. more than 2, individuals will suffer a bad reaction

4.a. Find a least squares straight line of Y on X for the given data: 5 CO3 K2

x	2	4	6	8	10	12
Y	1.8	1.5	1.4	1.1	1.1	0.9

b. Determine the correlation coefficient for the correct 5 CO3 K3

x	50	60	70	90	100
Y	65	51	40	26	8

(OR)

c. Find a least squares quadratic curve the given data: 5 CO3 K3

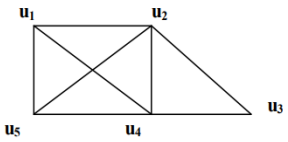
x	1	3	4	6	8	9	11	14
Y	1	2	4	4	5	7	8	9

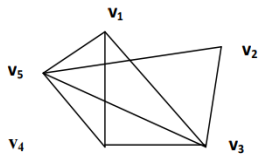
d. Determine the correlation coefficient for the correct 5 CO3 K3

x	1	2	3	4	5	6
Y	6	4	3	5	4	2

5.a. Let G be connected planner simple graph with E edges and V vertices. Let R be the number of regions in a planner representation of G. then show that $R = E - V + 2$ 5 CO3 K3

b. Examine whether the following pair of graphs are isomorphic. If not isomorphic, give the reasons 5 CO3 K2





(OR)

c. Show that isomorphism of simple graphs is an equivalence relation. 5 CO4 K3

d. Show that K_7 has Hamiltonian graph. How many edge disjoint Hamiltonian cycles are there in K_7? List all the edge-disjoint Hamiltonian cycles. Is it Eulerian graph 5 CO4 K2

6.a. If 3 cars are selected randomly from 6 cars having 2 defective cars.

a) Find the Probability distribution of defective cars. 5 CO5 K2

b) Find the Expected number of defective cars.

b. In tossing a coin 15 times simultaneously. Find the probability of getting

i. at least 5 heads

ii. almost 4 heads 5 CO5 K3

iii. exactly 6 heads

(OR)

c. Explain the role of binomial coefficients in combinatorial enumeration. 5 CO5 K3

d. Write the types of probability distributions are commonly used in neural networks. 5 CO5 K3

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