QP Code: RJ23MTECH005 | Reg. No | | | | | | | | | | | AY 23

GIET UNIVERSITY, GUNUPUR – 765022

M. Tech. (First Semester) Examinations, January – 2024

MPCCS1010 – Mathematical Foundation of Computer Science

(CSE)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A **(2 x 10 = 20 Marks)**

Q.1	Answer all questions	CO#	Blooms Level
a.	Verify whether the function $f(x) = \begin{cases} \frac{x^2}{2} & -1 < x < 2 \\ 0 & elesewhere \end{cases}$ is probability density function or not.	CO1	K2
b.	If $f(x,y) = \begin{cases} 4xy & 0 < x < 1, 0 < y < 1 \\ 0 & elsewhere \end{cases}$ is a jpdf then find $P(0 \leq X \leq \frac{1}{2} \; and \; \frac{1}{4} \leq y \leq \frac{1}{2})$	CO1	K3
c.	If a coin is tossed 400 times and the random variable X denotes the number of head occurs then find the expectation of X.	CO1	K3
d.	Find maximum likelihood estimator for mean of Exponential distribution.	CO2	K2
e.	The probability that a patient recover from a heart operation is 0.9. What is the probability that exactly 5 of next 7 patients having this operation survive?	CO3	K2
f.	Derive the mean of Poisson distribution.	CO2	K2
g.	Write the necessary conditions for Isomorphism of two graphs.	CO4	K2
h.	The average Zinc concentration of sample of 36 different locations is found to be 2.6 grams per millilitre. Find 95% confidence interval for mean zinc concentration. Assume that the population standard deviation is 0.3.	CO4	K2
i.	Let G be a planar graph with 20 vertices and let the planar representation split the plane in to 12 regions. Then how many edges it has?	CO4	K2
j.	Define Chromatic number with an example.	CO4	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ANY FIVE*** questions

		Marks	CO#	Blooms Level
2.	Derive mean and Variance of a) Hyper geometric distribution. b) Exponential Distribution	10	CO2	K2
3.	The joint density for the random variables (X,Y), Where X is the unit temperature change and Y is the proportion of spectrum shift that a certain atomic particle produces, is $f(x,y) = \begin{cases} 10xy^2, & 0 < x < y < 1 \\ 0, & elsewhere \end{cases}$	10	CO1	K2

a) Find the marginal densities f(x) and f(y)

b) Find the conditional density f(y/x)

c) Check whether X and Y are independent?

4. Find maximum likelihood estimator for mean and variance of Normal distribution. 10 CO3 K2

5.a) A random sample of 64 bags of white cheddar popcorn weighted, on average 5.23 ounces with standard deviation of 0.24 ounces. Test the hypothesis that $\mu = 5.5$ ounces against the alternative hypothesis, $\mu < 5.5$ ounces at the 0.05 level of significance. 5 CO3 K2

b) A die is tossed 180 times with the following results: 5 CO3 K2

x	1	2	3	4	5	6
f	28	36	36	30	27	23

Is this a balanced die? Use a 0.01 level of significance.

6. Test the hypothesis that the average content of containers of a particular lubricant is 10 litres. If the contents of random sample of 10 containers are 10.2, 9.7,10.1, 10.3, 10.1, 9.8, 9.9, 10.4, 10.3 and 9.8 litres. Use a 0.01 level of significance. 10 CO3 K2

7. State and prove Euler's formula of planar graph. 10 CO4 K2

8. Explain Principal Component Analysis with an example. 10 CO5 K2

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