SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MATHEMATICS
ACADEMIC YEAR: 2022-2023 (EVEN)

Test: CLA 4 (Assignment -1)
Course Code & Title: 18MAB204T / Probability and Queueing Theory
Year & Sem: II & IV **Max. Marks:** 20

Course Articulation Matrix:

At the end of this course, learners will be able to:			Program Outcomes (PO)											
Course Outcomes (CO)		Learning Bloom's Level	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Apply the concepts of probability and random variables in engineering problems.	4	3	3										
CO2	Identify random variables and model them using various distributions.	4	3	3										
CO3	Infer results by using hypothesis testing on large and small samples	4	3	3										
CO4	Examine F test, Chi Square test in sampling techniques and analyse the performance measures of queuing models.	4	3	3										
CO5	Determine the transition probabilities and classify the states of Markov chain.	4	3	3										
CO6	Apply probability techniques and implement them in the study on sampling distributions, queueing models and Markov chain	4	3	3										

Answer all the questions
(5 x 4 = 20 Marks)

Question No. 1	Marks	BL	CO	PO	PI Code
	4	4	1	2	2.8.1

The following is the distribution function of a discrete random variable X:

x	-3	-1	0	1	2	3	5	8
$F(x)$	0.10	0.30	0.45	0.65	0.75	0.90	0.95	1

Find (i) the probability mass function of X (ii) $E(X)$ (iii) $P(|X| > 2)$
(iv) $P(|X| \leq 3)$ and (v) $P((-3 < X < 5)|X > 0)$.

Question No. 2	Marks	BL	CO	PO	PI Code
	4	3	1	2	2.8.1

A random variable X has the pdf $f(x) = \begin{cases} 3x^2, & 0 < x < 1 \\ 0, & otherwise \end{cases}$

Find (i) $P\left(X > \frac{1}{3}\right)$ (ii) $P\left(\frac{1}{3} < X < \frac{2}{3}\right)$

(iii) $P\left(X > \frac{1}{2} | X < \frac{3}{4}\right)$, (iv) $P\left(|X| < \frac{1}{4}\right)$ and (v) $E(X)$.

Question No. 3	Marks	BL	CO	PO	PI Code
	4	3	1	2	2.8.1

The probability density function of a continuous random variable X

is given by $f(x) = \begin{cases} Kx(3-x), & 0 \leq x \leq 3 \\ 0, & otherwise \end{cases}$ find (i) k

(ii) the rth moment about the origin and hence find the mean, variance and $\mu_{3'}$

Question No. 4	Marks 4	BL 3	CO 2	PO 2	PI Code 2.8.1

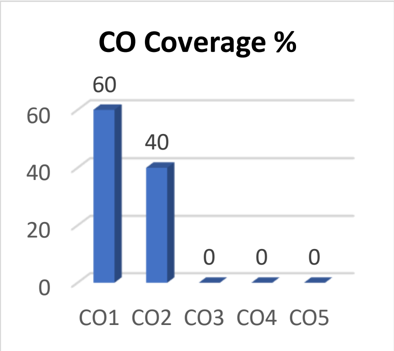
Five dice were thrown 1000 times and at each throw the number of successes were noted (success was defined as getting even number) and the following data were obtained denoting the number of successes by x:

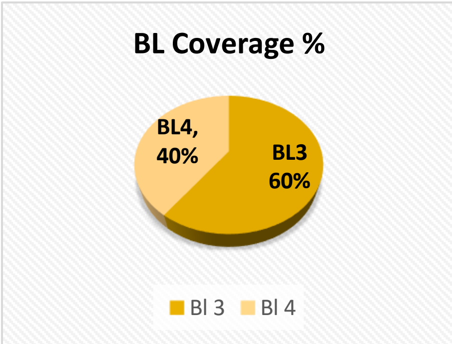
x	0	1	2	3	4	5	Total
f	38	144	342	287	164	25	1000

Fit the binomial distribution to this data.

Question No. 5	Marks 4	BL 4	CO 2	PO 2	PI Code 2.8.1

A component has an exponential time to failure distribution with mean of 500 hrs. (a) The component has already been in operation for the mean life. What is the probability that it will fail by 800 hrs? (b) At 800 hrs. the component is still in operation. What is the probability that it will operate for another 250 hrs?





Evaluation Sheet

Name of the Student:

Register No.

R	A													

5 x 4 = 20 Marks			
Q. No	**CO**	**Marks Obtained**	**Total**
1	**1**		
2	**1**		
3	**1**		
4	**2**		
5	**2**		

Consolidated Marks:

CO	Marks Scored
CO 1	
CO2	
Total	

Signature of the Course Teacher