PAPER ID-311503

Subject Code: MTEC101

Roll No: | | | | | | | | | | | | | |

MTECH

(SEM I) THEORY EXAMINATION 2023-24

ADVANCED ENGINEERING MATHEMATICS

TIME: 3HRS **M.MARKS: 70**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a.	Prove that the set of all polynomials is a vector space over the field F.
b.	What is mean and variance of Poisson distribution.
c.	Write limitations of moment generating functions.
d.	Define joint cumulative distribution function.
e.	What is sampling?
f.	Define transient states.
g.	Write Chapman-Kolmogorov equation.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	Prove that a non empty subset W of Vis a subspace of a vector space V(F),if and only if for each pair of vectors u, v ∈ W and each scalar a∈ F, the vector au+v ∈ W.
b.	Write short notes on i) Poisson distribution ii) Normal distribution.
c.	A discrete random variable X has the following probability mass function Value of x: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 P(x): 0 | k | 2k | 2k | 3k | k^2 | $2k^2$ | $7k^2+k$ i) Find k ii) Determine the distribution function of X
d.	Define stochastic process and Markov process with example.
e.	Write brief notes on Markov process.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

a.	Let T be a linear transformation from U into V, then prove that T is non singular, if and only if T is one-one.
b.	Show that the function T: $R^2 \rightarrow R^3$ given by $T(x_1,x_2) = (x_1 - x_2, \ 2x_2 - x_1, -x_1)$ is linear transformation

4. Attempt any *one* part of the following: **7 x 1 = 7**

a.	Define random variable, Binomial random variable and discrete random variable with suitable example.
b.	Derive mean and variance of Binomial distribution.

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5. Attempt any *one* part of the following: 7 x 1 = 7

a. Calculate the correlation coefficient for the following height of father X and his sons Y.

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

b. Find Cor (X,Y) for the following discreat bi-variate distribution.

Y\X	.5	15
10	0.2	0.4
20	0.3	0.1

6. Attempt any *one* part of the following: 7 x 1 = 7

a. In a sample random sample, the sample variance s^2 is an unbiased estimate of the population variance S^2.

b. Prove that mean of a random sample is an unbiased estimate of the population mean.

7. Attempt any *one* part of the following: 7 x 1 = 7

a. What do you understand by queue? Give some important applications of queuing theory.

b. What do you understand by queue? Give some important application of queuing theory.