

# Jaypee University of Engineering & Technology, Guna

T-3 (Odd Semester 2022)

18B11MA511- Probability Theory and Random Processes

007936

Maximum duration: 2 Hours

Maximum Marks: 35

Notes:

1. This question paper has 5 (five) questions.
2. Write relevant answers only.
3. Do not write anything on question paper (Except your Er. no.)

Marks CO no.

[02] CO2

[05] CO3

03

$$f(x, y) = \begin{cases} x + y; & 0 \leq x \leq 1, \quad 0 \leq y \leq 1 \\ 0, & \text{Otherwise} \end{cases}$$

Find :

- (i) Marginal distribution function of x and y
- (ii) Expected value of x and y
- (iii) Covariance (x, y)

[02] CO2

[05] CO4

Find :

- (i) Expected function of the random process X(t)
- (ii) Auto correlation function of X(t)
- (iii) Auto covariance function of X(t)

[02] CO2

2

[05] CO5

3

Find:

- (i) Markov chain diagram and the transition probability matrix
- (ii) Steady state probabilities of sells to each city.

Q4 The probability density function of the times to failure in years of the engineering instrument manufactured by certain company is given by.

[07] CO4

⑦

$$f(t) = \frac{200}{(t+10)^3}, \quad t \geq 0$$

Answer the followings:

- (a) Derive the reliability function and determine the reliability for first year of operation.
- (b) Compute the "Mean Time To Failure (MTTF)" of the instrument.
- (b) What are the design life values of the instrument at the reliability 0.95 and 0.90

Q5 (a) For the following network (Fig. a), derive the expression for system reliability in terms of component reliability R of each component.

[04] CO5

④

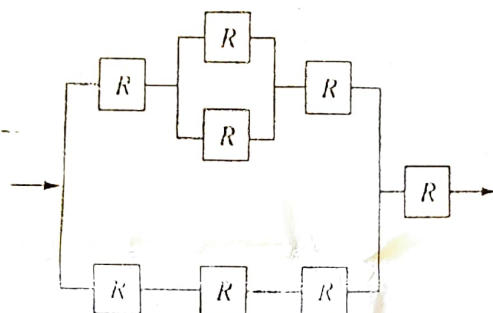


Fig. a

(b) Find the system reliability of following system network (Reliability of each component is mentioned in Fig. b)

[03] CO5

③

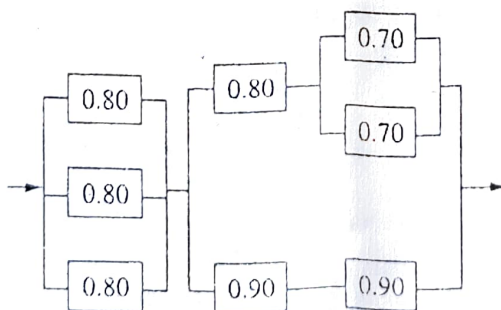


Fig. b