

**M.C.A. Sem - IV (Choice Based Credit System 2011 & 2012 Course ) :  
SUMMER - 2019**

**SUBJECT : PROBABILITY & SIMULATION**

Day : Thursday  
Date : 02/05/2019

**S-2019-2176**

Time : 10.00 AM TO 01.00 PM  
Max. Marls : 100

**N.B.**

- 1) Attempt **ANY FOUR** questions from **Section - I** and **ANY TWO** questions from **Section - II**.
- 2) Answers to both the sections should be written in SAME answer book.
- 3) Use of non- programmable **CALCULATOR** is allowed.

**SECTION - I**

**Q.1** Explain the following terms with suitable examples. **(15)**

- a) Random Experiment
- b) Sample space
- c) Random variable
- d) Expected value
- e) Independence of an event

**Q.2** a) A box contains 4 oranges, 6 apples & 5 mangoes. One fruit is drawn at random. Find the probability that the fruit drawn is not an orange. **(07)**

- b) The probability that a person stopping at a petrol pump will ask for petrol is 0.80, the probability will ask for water is 0.70 and the probability that he will ask for both is 0.65. Find the probability that a person stopping at this petrol pump will ask for
- i) Either petrol or water.
  - ii) Neither petrol nor water.

**Q.3** A large population has a mean height of 150 cm and a standard deviation of 21 cm. A random sample of size 100 is taken from this population. Find the probability that the sample mean will **(15)**

- i) exceed 151 cm
- ii) lie between 148 cm and 155 cm
- iii) lie between 145 cm and 150 cm

**Q.4** Explain the concept of probability distribution. Describe the properties of Normal Distribution & Poisson Distribution in brief. **(15)**

**Q.5** The rainfall distribution in monsoon season is as follows **(15)**

Rain in cm	0	1	2	3	4	5
Frequency	50	25	15	5	3	2

Simulate the rainfall for 10 days using following random numbers.  
67, 63, 39, 55, 29, 78, 70, 06, 78, 76  
Also find average rainfall.

**Q.6** Write short notes on **ANY THREE** of the following: **(15)**

- a) Central Limit Theorem
- b) Negative binomial distribution
- c) M / M / 1 Queue Model
- d) Conditional Probability

**P.T.O.**

**SECTION - II**

- Q.7** Three machines A, B and C with capacities proportional to 4 : 2 : 3 are producing identical items. The percentages that the machine produce defective are 4%, 3% and 5% respectively. At the end of a day from the total production one item is selected at random and is found defective. **(20)**
- i) What is the chance that it came from machine A?
  - ii) What is the chance that it came from machine B?

- Q.8** In a company the machines that breakdown follow a Poisson Distribution with an average rate of four per hour. The machines are then brought to the repair section, where there is only one repairman, who provides his services on contract. The cost of non-productive machine is Rs.50 per hour. The repairman charges Rs.100 per hour and repairs the machines at an average rate of 6 per hour. Find **(20)**
- i) Average time for which a machine will be kept in a repair shop.
  - ii) Probability that there are 3 machines in the repair shop.
  - iii) Probability that there are more than 2 machines in the waiting line.
  - iv) Total cost incurred per hour.

- Q.9 a)** Describe the term probability mass function with suitable examples. **(10)**
- b)** Find  $E(X)$  and  $V(X)$  for the following distribution of  $X$ . **(10)**

X	8	12	16	20	24
P(X)	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{12}$

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