

- N.B.:**
- 1) Attempt any One question from each sections.
 - 2) Figures to the right indicate full marks.
 - 3) Statistical tables will be provided on request.

Section - I

- Q.1 a)** X and Y are two stochastically, independent random variables with means 5 and 12 and variance 2 and 3, respectively.

- Find (i) $E(x + y)$
 (ii) $E(3x + 2y)$
 (iii) $V(x + y)$
 (iv) $V(3x + 2y)$

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- Q.1 b)** Following is joint probability mass function of X and Y

$x \backslash y$	1	2	3
5	—	0.05	0.10
10	0.15	0.20	0.20
15	0.10	0.05	0.05
20	—	—	0.10

- Obtain
- i) Marginal probability distributions of X and Y
 - ii) Conditional Probability distribution of Y when $X \geq 10$.
 - iii) Find Cov (x, y) & Corr (x, y)

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- Q.1 c)** A bag contains 30 counters numbered from 1 to 30. One counter is drawn at random. What is the probability that the number on the counter is a.

- i) Perfect square
- ii) Multiple of 5 and 7
- iii) Multiple of 5 or 7

5

- Q.2 a)** Find mean and variance for the following probability distribution of the random variable X.

5

X :	-2	-1	0	1	2
P(x) :	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{16}$

- Q.2 b)** It is known that on an average three accidents take place in the busy streets of Mumbai everyday. Find the probability that

- i) No accident will take place tomorrow.
- ii) One accident will take place tomorrow.
- iii) at least one accident will take place tomorrow.

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- Q.2 c)** It is observed that 30% of the students in a class are swimmers. If 3 students are selected at random from this class. What is the chance that among them

- i) Only one of them wear glasses.
- ii) no one wear glasses.

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Section - II

- Q.3 a)1)** The distribution of number of words written per day by a certain writer over a period of one year showed Rectangular distribution. Over (1000, 2000). Find the chance that on a randomly chosen day of the year he wrote
- at least 1200 words.
 - any where from 1250 to 1750 words.
- 4
- Q.3 a)2)** The life time of certain battery is a random variable which has an exponential distribution with mean of 320 hours ? What is the probability that such a battery will last for atmost 1600 hours?
- 2
- Q.3 b)** For a continuous random variable 'X' probability density function is given by
- $$f(x) = \begin{cases} Kx & 0 < x < 2 \\ 0 & \text{otherwise.} \end{cases}$$
- find (i) K
(ii) mean
(iii) standard deviation of X.
- 5
- Q.3 c)** The income distribution of a group of 10,000 persons was found to be normal with mean Rs. 750 p.m. and standard deviation Rs. 50/- p.m. What percentage of this group had income.
- exceeding Rs. 668
 - exceeding Rs. 832
- 4
- Q.4 a)** A group of 121 boys obtained mean intelligence quotient (IQ) of 84 while a group of 81 girls obtained 80. If the standard deviation of IQ is given to be 10 can we conclude that there is a significant difference between their performances ? Use 5 % level of significance.
- 5
- b)** The following are the results of the tests performed on two brands of tyres manufactured by a manufacturer.
- | | Brand A | Brand B |
|----------------------------|---------|---------|
| Lasted more than 30,000 km | 27 | 38 |
| Failed to last 30,000 km | 18 | 27 |
- Use chi - square at 5% level of significance to test whether we can say that the two brands of tyres differ significantly or not as regard their life-span.
- 7
- c)** An item is packed in lots of 100 each let M denote the mean number of defectives in a packet of 100. To test $H_0 : m = 2$ against $H_1 : m = 3$ it is decided. to select one packet and inspect the items in it. If it contains four or more defectives, it is proposed to reject H_0 . Find the level of significance for the test.
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