



- N. B. :**
1. All questions are compulsory.
 2. Figures to the right indicate marks.
 3. Statistical tables will be provided on request.

Q.1 Solve any THREE questions from the following.

- a. The probability that a person stopping at a petrol pump will ask for petrol is 0.80, the probability that he will ask for water is 0.70 and 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
 - iii. only petrol

(5)

- b. Find K for the following case so that p(x) can be regarded as a probability distribution function.

x	:	-1	0	1	2
p(x)	:	$\frac{k+1}{13}$	$\frac{1}{13}$	$\frac{k}{13}$	$\frac{k-4}{13}$

Also find cumulative distribution, Expected value of x and variance of x.

(5)

- c. Following is the joint probability mass function of x and y.

x \ 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). Are x and y correlated.

(5)

- d. The percentage of defective blades manufactured by a firm is known to be 10%. If a packet of 5 blades produced by this firm is selected at random, determine the probability that there are
- i. exactly two defectives in this packet.
 - ii. None of the blades are defective.
 - iii. Atleast one of the blades is defective.

(5)

- e. On an average one call is received in every ten minutes at a switch board. Find the probability that (i) no call (ii) one call (iii) more than one call shall be received at the switchboard between 10.00 AM and 10.15 AM tomorrow ?

Q.2 Solve any THREE questions from the following.

- a. For a continuous random variable x its p.d.f. is given by

$$f(x) = k(x-1)^2 \quad 1 < x < 3$$
$$= 0 \quad \text{Otherwise}$$

Find k , mean of x , (5)

- b. A study of divorced men showed that the interval of time (in years, x) between the day of their marriage and the day of their divorce has the following p.d.f.

$$f(x) = 0.2e^{-0.2x} \quad x > 0$$
$$= 0 \quad \text{Otherwise}$$

Find the probability that one Mr X who got divorced during the last year, spent

- (i) at most one year
(ii) at least 5 years of marital life before the divorce. (5)

- c. If the marks in a particular subject are assumed to follow normal distribution with mean 40 and variance 9. Find how many out of 1000 students get marks

- (i) below 35
(ii) between 43 and 76 (5)

- d. A large population has a mean height of 150 cm and a standard deviation of 20 cm. A random sample of size 100 is taken from this population find the probability that the sample mean will

- (i) exceed 151 cm
(ii) lie between 148 cm and 155 cm.
Assume that the population of heights is normal and that the sampling is with replacement. (5)

- e. Two samples of 100 and 150 tennis balls drawn from two different lots gave 6% and 8% defective balls respectively. Test whether both the lots come from the balls manufactured by same process. (5)
