

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

Q.1 a. Define continuous Random variable x and its probability density function. Define mean of x and variance of x . (6)

b. For a continuous random variable with p.d.f.
 $f(x) = kx(2 - x) \quad 0 \leq x \leq 2$
 $= 0 \quad \text{otherwise}$
Find k . Also find $P[x \geq 1]$ (6)

OR

p. For a continuous random variable x Define cumulative probability Distribution function and state its properties. Also define Median. (6)

q. For a continuous random variable x with p.d.f.
 $f(x) = \frac{k}{x^3} \quad ; x \geq 5$
 $= 0 \quad \text{otherwise}$
Find k , mean of x . (6)

Q.2 a. State the probability density function of an exponential variate x with parameter λ . Hence Derive expression for its mean and variance. (6)

b. A municipal corporation had installed 5000 bulbs in the streets of the city. If these bulbs have an average life of 800 burning hours, with a standard deviation of 200 hours. Find

- i. What number of bulbs might be expected to fail in the first 600 burning hours?
- ii. The number of bulbs expected to fail between 700 and 900 burning hours and
- iii. The number of bulbs expected to fail after 900 burning hours. (6)

OR

p. The demand of cakes (in kg) at a bakery shows Rectangular distribution in (1000, 1500). Find the probability that on a certain day the demand would be

1. atleast 1200 kg
2. between 1100 kg and 1450 kg
3. atmost 1400 kg (6)

q. State the probability density function of normal variate with mean 50 and variance 10. Mention the important properties of normal distribution. (6)

Q.3 a. Explain the concept with example.

1. Statistic
2. Parameter
3. Estimator (6)

- b.** An advertising firm claims that 20% of all TV viewers watch a specific T.V. programme. In a random sample of 1000 viewers only 184 were found to be watching this T.V Programme. Test at 5% level of significance whether this is sufficient evidence to dismiss the advertiser's claim. (6)

OR

- p.** Define the following terms, with example.
1. Critical region
 2. Simple hypothesis and composite hypothesis
 3. Type I error and Type II error. (6)
- q.** A survey of 36 married people yields a mean age at the time of their marriage as 26 years with a standard deviation of 2.4 years. Find 95% confidence limits for the age at the time of marriage. (6)

- Q.4 a.** A group of 40 underweight young children is split in half, with the two groups observing two different diets for the next month. The 20 children in the first group showed an average weight gain of 5.6 pounds with a standard deviation of 1.6 pounds while the 20 children in the second group showed an average gain of 9.8 pounds with a standard deviation of 3.9 pounds. Does this imply that the second diet was more effective? (7)

- b.** The life time of a 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 at most 160 hours? Also find the probability that such a battery will last between 640 and 690 hours? (7)

OR

- p.** Find the cumulative distribution function $F(x)$ for the random variable x with p.d.f. as
- $$f(x) = \begin{cases} x & 0 < x < 1 \\ 2 - x & 1 \leq x < 2 \\ 0 & \text{otherwise} \end{cases}$$
- Also find its mean and variance. (7)

- q.** 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 No. of persons of this group had income.
1. exceeding Rs. 668
 2. exceeding Rs. 832. (7)
