

**Note :**

- 1) Attempt any three questions out of four.
- 2) All questions carry equal marks.
- 3) Figures to the right indicate marks assigned.

Q.1. Attempt any two sub-questions out of three from the following.

a) For the following probability density function.

$$\begin{aligned}
 f(x) &= \frac{1}{4} && ; 0 \leq x < 1 \\
 &= \frac{x}{3} && ; 1 \leq x < 2 \\
 &= \frac{3}{28} (x-1)^2 && ; 2 \leq x < 3 \\
 &= 0 && \text{otherwise.}
 \end{aligned}$$

- Find (i)  $p [x \leq 1/2]$   
(ii)  $p [1/2 < x < 3/2]$

(5)

b) Find the probability density function of  $x$  from the given cumulative distribution function.

$$\begin{aligned}
 F(x) &= 0 && ; x < 0 \\
 &= \frac{x^2}{2} && ; 0 \leq x < 1 \\
 &= 2x - \frac{x^2}{2} - 1 && ; 1 \leq x < 2 \\
 &= 1 && ; x \geq 2
 \end{aligned}$$

Also find its mean

(5)

c) For a continuous random variable  $x$ , its probability density function is given by

$$\begin{aligned}
 f(x) &= kx^2(1-x) && ; 0 < x < 1 \\
 &= 0 && \text{otherwise}
 \end{aligned}$$

- Find (i) The value of  $K$   
(ii) Mean  
(iii) variance

Q. 2. Attempt any two questions out of three from the following :

a) A baking company sells cakes by weight. The manager of the company finds that the demand for cake on a day varies in a uniform manner between



2000kg and 3000kg. Further he finds the distribution of profit as under from his experience.

Daily Demand (in kg) :	2000 - 2250	2250 - 2500	2500 - 3000
Average Profit (in Rs.)	981.50	1136.50	1344.20

Find the probability that on a randomly selected day the demand lies

- between (i) 2000 and 2250 kg  
 (ii) 2250 and 2500 kg  
 (iii) 2500 and 3000 kg

Hence find expected profit.

(5)

- b) The life (in hours  $x$ ) of electronic tubes manufactured by a certain process is known to have p.d.f.

$$f(x) = \frac{1}{500} e^{-\frac{1}{500}(x-500)} ; x \geq 500$$

= 0 otherwise.

Determine the chance of one such tube lasting for

- (i) atleast 1000 hours  
 (ii) atleast 1500 hours  
 (iii) atleast 400 hours.

(5)

- c) The weights of 5000 N.C.C. cadets are found to be normally distributed with mean = 50kg and standard deviation = 5kg. To improve the standard of the organisation it is decided to retain only those having weight between 42.5kg and 65kg. Find the number of cadets that will have to be discharged due to this decision.

(5)

Q. 3. Attempt any two questions out of three from the following.

- a) Out of 1200 persons from a town. 138 are smokers. Estimate the percentage of smokers in the town. Also estimate standard error of your estimate.

(5)

- b) A sample of 60 men and 140 women showed that 40 men and 40 women from among them made cash purchase from a department store while the rest purchased on credit. Does it indicate that there is a significant difference between the buying habits of men and women customers of the department store? Use 1% level of significance.

(5)

- c) Fit poisson distribution to the following data and test for the goodness of fit.

$x$ :	0	1	2	3	4	5
$f(x)$ :	20	34	27	15		



- Q. 4. a) The means of two samples of 1000 and 2000 members are 67.50" and 68.00" respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5? (Test at 5% level of significance) (5)
- b) The distribution of daily incomes of a group of 3000 workers confirm to a normal curve with the mean equal to Rs. 600 and the standard deviation equal to Rs. 100. Find the :- (5)
- (i) percentage of workers having a daily income of more than Rs. 800.
- (ii) The number of workers having a daily income of less than Rs. 400.
- c) For the following probability density function, (5)
- $$f(x) = kx \quad ; \quad 0 < x < 2$$
- $$= 0 \text{ otherwise.}$$

- Find
- (i) K
- (ii) cumulative distribution function
- (iii)  $p [0 < x < 1]$

