

syBA sem IV statistics Pract  
NO3AEF — II

Time: 1 Hrs.30 Mins.

Marks: 40

N.B. (i) All questions are compulsory.

(ii) Attempt ANY TWO-sub questions out of THREE in each question.

(ii) Figures to the right indicate marks.

Q.1. (a) For a continuous random variable, p.d.f. is 5  
 $f(x) = kx \quad 0 < x < 2$

$$= 0 \quad \text{otherwise}$$

Find  $k$ , mean and standard deviation of  $X$ .

(b) Suppose the number of minutes a typist spends during an eight hour day for non-productive activities has the p.d.f. 5

$$f(x) = \frac{k}{x^3} \quad x \geq 30$$

$$= 0 \quad \text{otherwise}$$

Find  $k$ . Also determine the probability that on a certain day she wastes at least 40 minutes of her working period.

(c) Determine cumulative distribution function  $F(x)$  for the following probability density function. 5

$$f(x) = kx \quad 0 \leq x \leq \frac{1}{2}$$

$$= 6(1-x) \quad \frac{1}{2} \leq x \leq 1$$

$$= 0 \quad \text{otherwise}$$

Where  $k$  is constant to be suitably chosen.

Q.2. (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.. Find the probability that on a randomly selected day the demand lies between 5

(i) 2000 and 2250 kg.      (ii) 2250 and 2500kg.

(b) The mileage (in thousands of miles) which car owners get with a certain kind of tyres is a random variable having probability density function 5

$$f(x) = \frac{1}{20} e^{-x/20} \quad x > 0$$

$$= 0 \quad x \leq 0$$

Find the probability that one of these tyres will last for (i) at most 10000 miles (ii) anywhere from 16000 to 24000 miles.

(c) If the heights of 1000 soldiers in a regiment are distributed normally with a mean of 172 cm. and a standard deviation of 5 cm., how many soldiers have heights greater than 180 cm.? 5

(The area under the standard normal curve between  $t = -1.6$  and  $t = 1.6$  is 0.8904)

- Q.3. (a) It is found that 10% of the days are foggy in a certain district. A sample of 900 days is taken from the meteorological records of the district. Find the probability that – 5  
 (i) at least 100 days are foggy (ii) not more than 120 days are foggy  
 (iii) the number of foggy days lies between 80 and 120.
- (b) If  $p$  denotes the probability of a fuse working properly, the following procedure is adopted to test the hypothesis  $H_0 : p = 0.9$  against the alternative  $H_1 : p = 0.8$ . Inspect four and retain  $H_0$  if all are working properly. Calculate the probabilities of Type I and Type II errors. At what level of significance is the test based? 5
- (c) A group of 121 boys obtained mean intelligence quotient (I.Q.) of 84 while a group of 81 girls obtained 80. If the s.d. of I.Q. is given to be 10, can we conclude that there is a significant difference between their performances? Use 5% level of significance. 5

- Q.4. (a) Find the cumulative distribution function  $F(x)$  for the random variable  $X$  with p.d.f. as 5

$$f(x) = \begin{cases} x & 0 < x < 1 \\ 2 - x & 1 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

Draw a sketch of  $f(x)$  and  $F(x)$ .

- (b) On an average 9 accidents are recorded in Mumbai every week. Find the chance that at the end of a certain week 12 to 15 accidents are recorded. Use Normal approximation to Poisson distribution. 5
- (c) A random sample of 400 tins of vegetable oil labeled '5 kg. net wt' gave a mean net weight of 4.93 kg. with a standard deviation of 0.22 kg. Do we reject the hypothesis of net weight of 5 kg. per tin on the basis of this sample, at 1% level of significance? 5

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