Model Question Paper

Probability Distributions - Part III

12th Standard

Business Maths

Reg.No. : | | | | | | |

I.Answer all the questions.

II.Use blue pen only.

Time : 01:30:00 Hrs

Total Marks : 95

Part-A

5 x 1 = 5

1) If a random variable X has the following probability distribution

x	1	-2	1	2
p(x)	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{3}$

then the expected value of X is

(a) $\frac{3}{2}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

2) If X~N (5, 1), the probability density function for the normal variate X is

(a) $\frac{1}{5\sqrt{2\pi}}e^{-\frac{1}{2}(\frac{x-1}{5})^2}$ (b) $\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}(\frac{x-1}{5})^2}$ (c) $\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}(x-5)^2}$ (d) $\frac{1}{\sqrt{\pi}}e^{-\frac{1}{2}(x-5)^2}$

3) If $X \sim N(8,64)$, the standard normal variate Z will be

(a) $Z = \frac{X-64}{8}$ (b) $\frac{X-8}{64}$ (c) $\frac{X-8}{8}$ (d) $\frac{X-8}{\sqrt{8}}$

4) If ,$X \sim N(\mu, \sigma^2)$, the points of inflection of normal distribution curve are

(a) $\pm\mu$ (b) $\mu \pm \sigma$ (c) $\sigma \pm \mu$ (d) $\mu \pm 2\sigma$

5) If ,$X \sim N(\mu, \sigma^2)$, the maximum probability at the point of inflection of normal distribution is

(a) $\frac{1}{\sqrt{2\pi}}e^{\frac{1}{2}}$ (b) $\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}}$ (c) $\frac{1}{\sigma\sqrt{2\pi}}$ (d) $\frac{1}{\sqrt{2\pi}}$

Part-B

5 x 6 = 30

6) Suppose the probability that an item produced by particular machine is defective equals 0.2. If 10 items produced from this machine are selected at random, what is the probability that not more than one defective is found? (e^{-2} = .13534)

7) The I.Q (intelligence quotient) of a group of 1000 school children has mean 96 and the standard deviation 12. Assuming that the distribution of I.Q among school children is normal, find approximately the number of school children having I.Q.
(i) less than 72 (ii) between 80 and 120

8) Find the area under the standard normal curve which lies
(i) to the right of Z = 2.70
(ii) to the left of Z = 1.73

9) Find the area under the standard normal curve which lies
(i) between Z = 1.25 and Z = 1.67
(ii) between Z = -0.90 and Z = -1.85

10) The marks in Economics obtained by the students in Public examination is assumed to be approximately normally distributed with mean 45 and S.D 3. A student taking this subject is chosen at random. What is the probability that his mark is above 70?

Part-C

6 x 10 = 60

11) Suppose that the life in hours of certain part of radio tubes is continuous random variable X with p.d.f is given by $F(x) = \begin{cases} \frac{100}{x^2}, & when x \geq 100 \\ 0 & elsewhere \end{cases}$ (i) What is the probability that all of three such tubes in a given radio set will have to be replaced during the first of 150 hours of operation ? (ii) what is the probability that all of three such tubes in a given radio set will have to be replaced during that first 150 hours of operation ?

12) In a sample of 1000 candidates the mean of certain test is 45 and S.D 15 . Assuming the normality of the distrbution find the following : (i) How many candidates score between 40 and 60 ? (ii) How many candidates score above 50 ? (iii) How many candidates score below 30 ?

13) In a normal distribution 20% of the items are less than 100 and 30% are over 200. Find the mean and S.D of the distribution .

14) Given the p.d.f of a continuous random variable X as follows $f(x) = \begin{cases} kx(1-x) & for 0 < x < 1 \\ 0 & otherwise \end{cases}$ Find k and c.d.f

15) Find the probability that atmost 5 defective fuses will be found in a box of 200 fuses if experience shows that 2 percent of such fuses are defective . (e^{-4} = 0.0183)

16) What is the probability that Z
(a) lies between 0 and 1.83
(b) is greater than 1.54
(c) is greater than -0.86
(d) lies between 0.43 and 1.12
(e) is less than 0.77

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