

## Subject: Engineering Mathematics

DPP-07

## Chapter: Probability

## Topic : Probability Distribution Concepts

- For a random variable  $x(-\infty < x < \infty)$  following normal distribution, the mean is  $\mu = 100$ . If the probability is  $P = \alpha$  for  $x \geq 110$ . Then the probability of  $x$  lying between 90 and 110 i.e  $P(90 \leq x \leq 110)$  and equal to
  - $1 - 2\alpha$
  - $1 - \alpha$
  - $1 - \alpha/2$
  - $2\alpha$
- Let  $X$  be a random variable following Normal distribution with mean  $+1$  and variance 4. Let  $Y$  be another normal variable with mean  $-1$  and variance unknown. If  $P(X \leq -1) = P(Y \geq 2)$ . The S.D. of  $Y$  is \_\_\_\_.
- A continuous random variable  $X$  has a probability density function  $f(x) = e^{-x}$ ,  $0 < x < \infty$ . Then  $P\{X > 1\}$  is
  - 0.368
  - 0.5
  - 0.632
  - 1.0
- Which one of the following statements is not true?
  - The measure of skewness is dependent upon the amount of dispersion
  - In a symmetric distribution, the values of mean, mode and median are the same
  - In a positively skewed distribution, mean  $>$  median  $>$  mode
  - In a negatively skewed distribution, mode  $>$  mean  $>$  median
- A random variable  $X$  has the density function  $f(x) = K \frac{1}{1+x^2}$ , where  $-\infty < x < \infty$ . Then the value of  $K$  is
  - $\pi$
  - $1/\pi$
  - $2\pi$
  - $1/2\pi$
- A random variable  $X$  has a probability density function  $f(x) = \begin{cases} kx^n e^{-x}; & x \geq 0 \\ 0; & \text{otherwise} \end{cases}$  ( $n$  is an integer) with mean 3. The values of  $\{k, n\}$  are
  - $\left\{\frac{1}{2}, 1\right\}$
  - $\left\{\frac{1}{4}, 2\right\}$
  - $\left\{\frac{1}{2}, 2\right\}$
  - $\{1, 2\}$
- What is the probability that at most 5 defective fuses will be found in a box of 200 fuses, if 2% of such fuses are defective?
  - 0.82
  - 0.79
  - 0.59
  - 0.85
- If  $X$  is a normal variate with mean 30 and standard deviation 5, what is Probability  $(26 \leq X \leq 34)$ , given  $A(z = 0.8) = 0.2881$  where  $A$  represents area.
  - 0.2881
  - 0.5762
  - 0.8181
  - 0.1616
- In a sample of 100 students, the mean of the marks (only integers) obtained by them in a test is 14 with its standard deviation of 2.5 (marks obtained can be fitted with a normal distribution). The percentage of students scoring 16 marks is
  - 36
  - 23
  - 12
  - 10

(Area under standard normal curve between  $z = 0$  and  $z = 0.6$  is 0.2257; and between  $z = 0$  and  $z = 1.0$  is 0.3413)
- Consider a random variable to which a Poisson distribution is best fitted. It happens that  $P_{(x=1)} = \frac{2}{3} P_{(x=2)}$  on this distribution plot. The variance of this distribution will be
  - 3
  - 2
  - 1
  - $2/3$

## Answer Key

- |        |         |
|--------|---------|
| 1. (a) | 6. (c)  |
| 2. (3) | 7. (b)  |
| 3. (a) | 8. (b)  |
| 4. (d) | 9. (b)  |
| 5. (b) | 10. (a) |



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