

2018

Time : 3 hours

Full Marks : 80

Answer from **both** the Sections as per direction*The figures in the right-hand margin indicate marks**Candidates are required to answer in their own words
as far as practicable*

(MATHEMATICS)

SECTION – A

1. Answer any *four* of the following : 4 × 4

(a) Two balls are drawn from a box containing 4 good and six defective balls. Find the probability that the second ball is good if the first one is found to be defective.

(b) Find the mean and variance of uniform probability distribution given by

$$f(x) = \frac{1}{n}, \text{ for } n = 1, 2, 3 \dots n.$$

(Turn Over)

- (c) A continuous random variable has the probability distribution function

$$f(x) = \begin{cases} Ke^{-x} & \text{if } x \geq 0 \\ 0 & \text{elsewhere} \end{cases}$$

Determine the constant K .

- (d) Ten coin are thrown simultaneously. Find the probability of getting at least seven heads.
- (e) Find mean of poisson distribution.

Or

2. Answer all questions of the following : 2×8

- (a) In a class of 12 boys and 8 girls, three students are selected at random one after the other, find the probability that first two are boys and third is girl.
- (b) If A and B are independent event then prove that A and B are also independent.
- (c) Define probability distribution function.

- (d) For the following distribution :

x	:	1	2	3	4	8	9
$P(X)$:	K	$3K$	$5K$	$7K$	$9K$	$11K$

Determine $P(X) \geq 3$.

- (e) Find recurrence formula for Poisson distribution.
- (f) If " X " is a normal variate with mean 30 and standard 5 find $P(26 \leq X \leq 40)$.
- (g) In a Binomial distribution consisting of 5 independent trials, probabilities of 1 and 2 success are 0.4096 and 0.2048 respectively. Find the parameter p .
- (h) Define discrete random variables and give an example.

SECTION - B

Answer all questions : 16×4

3. (a) State and prove Baye's theorem on probability.

(4)

Or

- (b) In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student. If student is selected at random and is found to be studying mathematics. Find the probability that the student is a (i) girl and (ii) boy.
4. (a) If the probability density function of random variable is given by

$$f(x) = \begin{cases} K(1-x^2) & \text{if } 0 \leq x \leq 1 \\ 0 & \text{elsewhere} \end{cases}$$

Find the probabilities that a random variable will take on a value (i) between 0.1 and 0.2 (ii) greater than 0.5.

Or

- (b) Probability density function of a random variable X is

$$f(x) = \begin{cases} \frac{1}{2} \sin x & \text{if } 0 \leq x \leq \pi \\ 0 & \text{elsewhere} \end{cases}$$

(5)

Find the mean, mode and median for the distribution and also find the probability between 0 and $\pi/2$.

5. (a) Prove that Binomial distribution approaches to Poisson distribution as $n \rightarrow \infty$.

Or

- (b) The mean and standard deviation of normal variate are 8 and 4 respectively. Find

(i) $P(5 \leq X \leq 10)$ (ii) $P(X \geq 5)$.

6. (a) Define the hypergeometric distribution. Find mean variance and moment generating function for this distribution.

Or

- (b) Define the power series distribution. Find mean variance and moment generating function for this distribution.