2016

Time : 3 hours

Full Marks : 60

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from all the Groups as directed.

Group – A

(Compulsory)

1. Choose the correct answer of the following :

 1×12 = 12

(a) Which of the following is correct :

(i) $P(A \cup B) \leq P(A)$

(ii) $P(A \cap B) \leq P(A)$

(iii) $P(A \cup B) \geq P(A)$

(iv) None of the above

(b) In Poisson distribution, the reccurrence relation for the probabilities is :

(i) $P(x + 1) = \frac{m}{x + 1} P(x)$

(ii) $P(x + 1) = \frac{m}{x - 1} P(x)$

(iii) $P(x) = \frac{m}{x - 1} P(x - 1)$

(iv) $P(x) = \frac{m}{x} P(x - 1)$

(c) For a distribution to be normal :

(i) $\beta_2 = 3$

(ii) $\beta_2 > 3$

(iii) $\beta_2 < 3$

(iv) $\beta_2 < 2$

(d) The arithmetic mean of x_1 and x_2 is $\frac{x_1 + x_2}{2}$. The standard deviation of x_1 and x_2 will be :

(i) $\frac{x_1 x_2}{2}$

(ii) $\frac{2}{x_1 + x_2}$

(iii) $\frac{x_1 - x_2}{2}$

(iv) $\frac{2}{x_1 - x_2}$

(e) The most frequently occuring value is called :

(i) Range

(ii) Mode

(iii) Median

(iv) Mean

(f) The coefficient of variation is equal to :

(i) X

(ii) $\frac{\sigma}{\bar{X}} \times 100$

(iii) $\frac{\bar{X}}{\sigma} \times 100$

(iv) $\frac{\bar{X}}{\sigma}$

(g) In a symmetrical distribution median is equal to :

(i) $\frac{Q_1 - Q_2}{2}$

(ii) $\frac{Q_1 + Q_2}{2}$

(iii) $\frac{Q_1 Q_2}{2}$

(iv) None of the above

(h) For the data :

x	y
1	5
2	4
3	3
4	2
5	1

The value of correlation coefficient between x and y is :

(i) 1

(ii) 0

(iii) –1

(iv) 2

(i) The equation $xe^x - x\sin x = 0$ is the example of :

(i) Linear equation

(ii) Algebraic equation

(iii) Transcedental equation

(iv) None of the above

(j) The real root of the equation $x^3 - 2x - 5 = 0$ lies between :

(i) 0 to 1

(ii) 1 to 2

(iii) 2 to 3

(iv) 3 to 4

(k) The probability of committing type I error is :

(i) α'

(ii) α

(iii) β

(iv) β'

(l) F-test is used to test :

(i) $H_0 : \mu = \mu_0$

(ii) $H_0 \cdot \sigma^2 = \sigma_0^2$

(iii) $H_0 : \sigma_1^2 = \sigma_2^2$

(iv) H_0 : the fit is good

Group – B

Answer any **three** of the following questions : 6×3 = 18

2. Find the arithmetic mean, standard deviation and coefficient of variation of the first n natural numbers.

3. Show that the correlation coefficient is independent of the change of origin and scale.

4. Show that $E(x + y) = E(x) + E(y)$.

5. Find the value of $\sqrt{12}$ using Newton – Raphson's method.

6. What do you mean by Analysis of Variance Technique ? Give the assumptions involved in it.

Group – C

Answer any **three** questions of the following : 10×3 = 30

7. What do you mean by the central tendency of the data ? What are its measures ? Describe them.

8. Derive Poisson distribution as a limiting case of binomial distribution. Obtain its moment generating function.

9. Show that the rank correlation coefficient is given by $\gamma = 1 - \frac{6\sum d_i^2}{n^3 - n}$.

10. Solve the following system of simultaneous linear equations using Gauss's ellimination method :

$$5x + 2y + 4z = 7$$

$$3x + 5y + 8z = 0$$

$$2x - 4z = -2$$

11. Define the following :

(a) Null hypothesis and alternative hypothesis

(b) Rejection region and acceptance region

(c) Type I error and Type II error

(d) One-tailed test and two-tailed test