FACULTY OF ENGINEERING
B.E. (IoT/IT) III - Semester (AICTE) (Main & Backlog) (New) Examination, February/ March 2024

Subject: Engg. Mathematics-III (P&S)/ Mathematics –III (P&S)

Time: 3 Hours   Max. Marks: 70

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each questions carries 14 Marks.

    (ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

    (iii) Missing data, if any, may be suitably assumed.

1. (a) A bag contains 40 tickets numbered $1, 2, 3 \ldots, 40$ of which four are drawn at random and arranged in ascending order $(t_1 < t_2 < t_3 < t_4)$. Find the probability of t_3 being 25.

    (b) Find the mean of binomial distribution.

    (c) Find the standard deviation of exponential distribution.

    (d) Fit a straight line of the form $y = a + bx$ to the following data.

x	1	2	4
y	-8	-1	13

    (e) State any two applications of $\chi^2 - test$.

    (f) Prove $r = \dfrac{\sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2}{2\,\sigma_x\,\sigma_y}$

    (g) State addition theorem of probability.

2. (a) A problem in mathematics is given to three students A, B and C whose chances of solving it are $\frac{1}{4}, \frac{1}{3}$ and $\frac{1}{5}$. What is the probability that the problem will be solved?

    (b) In bolt factory, machines A, B and C manufacture $25\%, 35\%$ and 40% of the total. Of their output $5\%, 4\%$ and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B or C.

3. (a) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction.

    (b) State any two applications of Poisson distribution.

4. A random variable X has density function

$$f(x) = \begin{cases} c\, e^{-3x}, & x > 0 \\ 0, & x \le 0 \end{cases}$$

Find (i) c (ii) $P(1 < X < 2)$ (iii) $P(X \ge 3)$ and (iv) $P(X < 1)$.