FACULTY OF ENGINEERING

B.E. (CSE/CME) IV – Semester (AICTE) (Main) (New) Examination,
September/October 2022

Subject: Mathematics- III

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) Find the mean for the following probability distribution.

x	-1	0	1	2	3
f	0.3	0.1	0.1	0.3	0.2

   (b) If X follows a binomial distribution such that $4P(x = 4) = P(x = 2)$ and if $n = 6$,
   then find p the probability of success.
   (c) Find the variance of uniform distribution.
   (d) Find the rank correlation coefficient for the following data.

x	1	2	3	4	5
y	2	5	3	8	7

   (e) Write any two applications at χ^2 test.
   (f) If A and B are two events such that $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{4}$ and $P(A \cap B) = \frac{1}{2}$, then
   find that $P(A|\bar{B})$.
   (g) Define exponential distribution.

2. (a) State and prove Bayes' theorem.
   (b) A bag contains 3 black and 4 red balls. Two balls are drawn at random one at a
   time without replacement. Find the probability that the first ball selected is black if
   the second ball is known to be red.

3. (a) Find the variance and moment generating function of Poisson distribution.
   (b) The first four central moments of a distribution are 0, 2.5, 0.7 and 18.75. Test the
   kurtosis of the distribution.

4. (a) Find the mean of normal distribution.
   (b) If X is a normal variate with mean 8 and standard deviation 4, then find (i) $P(X \le 5)$
   and (ii) $P(5 \le X \le 10)$.

5. (a) Fit the least square line $y = a + bx$ for the following data.

x	-2	0	2	4	6
y	1	3	6	8	13

   (b) In two large populations, there are 30% and 25% respectively of fair haired people.
   Is this difference likely to be hidden in samples of 1200 and 900 respectively from
   the two populations? Test at 1% level of significance.

6. Two samples are drawn from two normal populations. From the following data, test
   whether the two samples have the same variances at 5% level of significance.

Sample I	60	65	71	74	76	82	85	87		
Sample II	64	66	67	85	78	88	86	85	63	91

7. (a) If $f(x) = \begin{cases} \frac{x}{6} + k, & 0 \le x \le 3 \\ 0 & \text{otherwise} \end{cases}$ is the p.d.f. of a random variable X, find
   (i) k and (ii) $P(1 \le X \le 2)$.

   (b) Fit a Poisson distribution to the following data.

x	0	1	2	3	4
f(x)	122	60	15	2	1