JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

B. Tech. -III Semester (CSE/IT)

COURSE CODE (CREDITS): 18B11MA313 (3) MAX. MARKS: 25

COURSE NAME: Probability and Statistics

COURSE INSTRUCTORS: BKP*, SST MAX. TIME: 1 Hour 30 Minutes

Note: *(a)All questions are compulsory.*

(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

(c)Use of scientific calculator is allowed.

Q.No.	Question	CO	Marks
Q1	There are three candidates shortlisted for the position of director in a research institute: a scientist, an engineer, and a manager. The chances of each being appointed as director are 0.40, 0.35, and 0.25 respectively. The probabilities that the research funding increases if they are appointed are 0.6, 0.5, and 0.4 respectively. (a) Determine the probability that research funding increases in the institute. (b) If research funding increases in the institute, what is the probability that the director is a scientist? (c) If research funding increases in the institute, what is the probability that the director is a manager?	CO-2	5
Q2	In a computer science class, 20% of students can solve a given algorithmic problem. A random sample of 10 students is selected. (a) What is the probability that exactly 3 students from the sample can solve the problem? (b) Also, calculate the probability that at most 2 students can solve the problem.	CO-3	4
Q3	The number of errors detected by a software testing team each day for 7 days is recorded as follows: Day: 1 2 3 4 5 6 7 Errors: 1 0 2 1 3 0 1 Fit a Poisson distribution to this data and estimate the expected error per day.	CO-3	4

<table>
<tr><td>Q4</td><td>Consider the following information of a frequency distribution:
$\mu_2 = \sigma^2 = 16, \mu_3 = 64, \mu_4 = 1024, mean = 10, mode = 11.$

(a) Find the Karl Pearson's coefficient of skewness and comment on the result.
(b) Obtain β_2 and hence classify the frequency curve on the basis of kurtosis.</td><td>CO-4</td><td>0.5+0.5
+0.5+0.5</td></tr>
<tr><td>Q5</td><td>A computer manager needs to know how efficiency of her new computer program depends on the size of incoming data. Efficiency will be measured by the number of processed requests per hour. Applying the program to data sets of different sizes, she gets the following results,

<table><tr><td>Data size (gigabytes), x</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>14</td></tr><tr><td>Processed requests, y</td><td>53</td><td>48</td><td>45</td><td>36</td><td>26</td><td>20</td></tr></table>
(a) Obtain Karl-Pearson's coefficient of correlation between data size and processed requests. Interpret the result.
(b) Estimate a regression line for processed requests and interpret the result.</td><td>CO-4</td><td>2.5+0.5
+2.5+0.5</td></tr>
<tr><td>Q6</td><td>Fit a least squares curve of the form $y = a_0 + a_2x^2$ to the following data:
<table><tr><td>x</td><td>1.0</td><td>2.5</td><td>3.5</td><td>4.0</td></tr><tr><td>y</td><td>3.8</td><td>15.0</td><td>26.0</td><td>33.0</td></tr></table>
Also estimate the value of y when $x = 3.0$ and $x = 5.0$.</td><td>CO-4</td><td>3+0.5
+0.5</td></tr>
</table>