**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**Supplementary Winter-2023**

**Course: B. Tech. Branch :Computer Engineering and Allied Semester :IV**

**Subject Code & Name: BTBSC404 Probability &Statistics**

**Max Marks: 60 Date:23/01/24 Duration: 3 Hr.**

***Instructions to the Students:***

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

| | | (Level /CO) | Marks |
|---|---|---|---|
| **Q. 1** | **Solve Any Two of the following.** | | **12** |
| **A)** | There are 3 true coins and 1 false coin with 'head' on both sides. A coin is chosen at random and tossed 4 times. If 'head' occurs all the 4 times, what is the probability that the false coin has been chosen and used? | **CO-2** | **6** |
| **B)** | If A and B are any 2 events such that $P(A) = \frac{3}{4}$ and $P(B) = \frac{5}{8}$. Prove that $\frac{3}{8} \leq P(A \cap B) \leq \frac{5}{8}$ | **CO-2** | **6** |
| **C)** | A box contains 5 green pencils and 7 yellow pencils. Two pencils are chosen at random from the box without replacement. What is the probability that both are yellow? | **CO-2** | **6** |
| **Q.2** | **Solve Any Two of the following.** | | **12** |
| **A)** | Find the value of $k$ , if the following function is a probability density function. $f(x) = \begin{cases} k(x-1)^3 & 1 \leq x \leq 3 \\ 0 & otherwise \end{cases}$ | **CO-1** | **6** |
| **B)** | A firm has two cars which it hires out day by day. The number of demands of a car each day is distributed as a Poisson variate of mean 1.5. Calculate the probable number of days in a year on which (i) neither car is in demand (ii) a demand is refused. | **CO-1** | **6** |
| **C)** | Five coins are tossed 100 times and the following results were obtained<br>No. of heads: 0 \| 1 \| 2 \| 3 \| 4 \| 5<br>frequency: 10 \| 20 \| 30 \| 15 \| 15 \| 10<br>Fit a Binomial distribution. | **CO-1** | **6** |
| **Q. 3** | **Solve Any Two of the following.** | | **12** |
| **A)** | Calculate Karl Pearson's co-efficients of correlation from the following data<br>x: 28 \| 45 \| 40 \| 38 \| 35 \| 33 \| 40 \| 32 \| 36 \| 33<br>y: 23 \| 34 \| 33 \| 34 \| 30 \| 26 \| 28 \| 31 \| 36 \| 35 | **CO-3** | **6** |

| | | | |
|---|---|---|---|
| **B)** | Calculate the value of rank correlation coefficient from the following data regarding marks of six students in statistics and accountancy in a test<br>Marks in statistics: 40, 42, 45, 35, 36, 39<br>Marks in accountancy: 46, 43, 44, 39, 40, 43 | **CO-4** | **6** |
| **C)** | Prove that limits of correlation coefficients are lies between $-1 \leq r \leq 1$. | **CO-4** | **6** |
| **Q.4** | **Solve Any Two of the following.** | | **12** |
| **A)** | Find the equations of the lines of regression on (i) Y on X and (ii) Xon Y and also a co-efficient of correlation from the following table.<br>X: 62, 64, 65, 69, 70, 71, 72, 74<br>Y: 126, 125, 139, 145, 165, 152, 180, 208 | **CO-3** | **6** |
| **B)** | The equations to the two lines of regression are $6y = 5x + 90$ and $15x = 8y + 130$. Find (i) the means of $x$ and y , (ii) the coefficient of correlation ,(iii) if variance of $x = 16$ , find also the standard deviation of $y$. | **CO-3** | **6** |
| **C)** | If the coefficient of correlation between two variables x and y is 0.5 and the acute angle between their lines of regression is $\tan^{-1}\left(\frac{3}{5}\right)$ . Prove that $\sigma_x = \frac{1}{2}\sigma_y$ . | **CO-3** | **6** |
| | | | |
| **Q. 5** | **Solve Any Two of the following.** | | **12** |
| **A)** | A manufacturer claims that only 4% of his products supplied by him are defective. A random sample of 600 products contained 36 defectives. Test the claim of the manufacturer. | **CO-4** | **6** |
| **B)** | A machine produced 16 defectives articles in a batch of 500. After overhauling it produced 3 defectives in a batch of 100. Has the machine improved? | **CO-4** | **6** |
| **C)** | A soap manufacturing company was distributing a particular brand of soap through a large number of retail soap. Before a heavy advertisement campaign, the mean sale per week per shop was 140 dozens. After the campaign a sample of 26 shops was taken and the mean sale was found to be 147 dozens with standard deviation of 16. Can you consider the advertisement effective? | **CO-5** | **6** |
| | ***** End ***** | | |