

	<b>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</b> <b>Regular and Supplementary Summer 2024</b> <b>Course: B. Tech. Branch: Electronics and Computer Engineering / Electronics and Computer Science Engineering</b> <b>Semester : IV</b> <b>Subject Code &amp; Name: BTBS404 Probability Theory and Random Processes</b> <b>Max Marks: 60                      Date: 20/06/2024                      Duration: 3.00 Hr.</b>						
	<b>Instructions to the Students:</b> 1. All the questions are compulsory. 2. Use of non-programmable scientific calculators is allowed. 3. Assume suitable data wherever necessary and mention it clearly.						
					(Level/CO)	Marks	
<b>Q. 1</b>	<b>Solve Any Two of the following.</b>					<b>12</b>	
<b>A)</b>	A bag contains 7 white, 6 green and 5 black balls. Two balls are drawn at random. Find the probability that they will both be white.					<b>6</b>	
<b>B)</b>	A Problem on calculus is given to two students Seeta & Geeta whose chances of solving it are $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability of the problem being solved, if both of them try independently.					<b>6</b>	
<b>C)</b>	If a machine is set up correctly it produce 90% good items, if it is incorrectly set up then it produce 10% of good items. Chances for a setting to be correct & incorrect are in the ratio 7:3 after a setting is made the first two items produced are found to be good items. What is the chance that the setting was correct?					<b>6</b>	
<b>Q.2</b>	<b>Solve Any Two of the following.</b>					<b>12</b>	
<b>A)</b>	Consider that the lifetime(x) & the brightness (Y) of a light tube are continuous random variables. The joint probability density function $f_{x,y}(X, Y) = \lambda_1 \lambda_2 e^{-(\lambda_1 X + \lambda_2 Y)}$ , $0 < X < \infty, 0 < Y < \infty$ , than find marginal density functions.					<b>6</b>	
<b>B)</b>	The probability that a bomb dropped from a plane will strike the target is $\frac{1}{5}$ . If six bombs are dropped, find the probability that i) Exactly two will strike the target. ii) At least two will strike the target.					<b>6</b>	
<b>C)</b>	The life of army shoes is normally distributed with mean eight months & S.D. two months. If 5000 pairs are issued, how many pairs would be expected to need replacement after 12 months? (The area under standard normal curve between 0 to 2 is 0.4772)					<b>6</b>	
<b>Q. 3</b>	<b>Solve Any Two of the following.</b>					<b>12</b>	
<b>A)</b>	Calculate the coefficient of correlation by Karl Pearson's method for following table					<b>6</b>	
	X	10	14	18	22	26	30
	Y	18	12	24	6	30	36

<b>B)</b>	If $r = 0.8$ , $\sum xy = 60$ , $\sigma_y = 2.5$ & $\sum x^2 = 90$ then find the number of items (n). Where $x$ and $y$ are the deviation from the arithmetic mean.	<b>C03</b>	<b>6</b>																						
<b>C)</b>	Obtain the Spearman's rank correlation coefficient to the following data <table><tr><td>X</td><td>70</td><td>64</td><td>82</td><td>55</td><td>64</td><td>90</td><td>82</td><td>50</td><td>60</td><td>64</td></tr><tr><td>Y</td><td>70</td><td>62</td><td>75</td><td>52</td><td>85</td><td>65</td><td>75</td><td>45</td><td>60</td><td>80</td></tr></table>	X	70	64	82	55	64	90	82	50	60	64	Y	70	62	75	52	85	65	75	45	60	80	<b>C03</b>	<b>6</b>
X	70	64	82	55	64	90	82	50	60	64															
Y	70	62	75	52	85	65	75	45	60	80															
<b>Q.4</b>	<b>Solve Any Two of the following.</b>		<b>12</b>																						
<b>A)</b>	If $\theta$ is the acute angle between the two regression lines for two variables X and Y, then show that $\tan\theta = \left  \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \left( \frac{r^2 - 1}{r} \right) \right $	<b>C04</b>	<b>6</b>																						
<b>B)</b>	Two lines of regressions are $5y-8x+17=0$ and $2y-5x+14=0$ . If $\sigma_y^2 = 16$ find i) The mean values of x and y. ii) The variance of x. iii) Correlation coefficient between x and y.	<b>C04</b>	<b>6</b>																						
<b>C)</b>	If $\bar{x}=8.2$ , $\bar{y}=12.4$ , $\sigma_x = 6.2$ , $\sigma_y = 20$ , $r(x, y) = 0.9$ then find the lines of regression. Estimate the value of x for $y = 10$ & estimate the value of y for $X = 10$ .	<b>C04</b>	<b>6</b>																						
<b>Q. 5</b>	<b>Solve Any Two of the following.</b>		<b>12</b>																						
<b>A)</b>	In a random sample of 340 students, 178 of the 210 females and 90 of the 130 males passed Statistics and Probability on their first take. Construct a 90% confidence interval for the population proportion of students who passed the subject.	<b>C05</b>	<b>6</b>																						
<b>B)</b>	A stenographer claims that she can take dictation at the rate of 120 words per minute. Can we reject her claim on the basis of 100 trails in which she demonstrates a mean of 116 words with a standard deviation of 15 words ? Use 5 percent level of significance.	<b>C05</b>	<b>6</b>																						
<b>C)</b>	700 ladies, out of sample of 1000, were consumers of lipsticks before GST. After GST 600 ladies, were consumers of lipsticks in a sample of 900 persons. Find out whether there is significant decrease in the consumption of lipsticks after GST. Given 1 % level of significance $Z_\alpha = 2.33$	<b>C05</b>	<b>6</b>																						
<b>*** End ***</b>																									