VIT UNIVERSITY
Vellore - Chennai
CHENNAI CAMPUS
Vandalur - Kelambakkam Road, Chennai - 600127

Continuous Assessment Test – II March 2023

Programme	B. Tech.	**Semester**	Winter Semester 2022-23
Course	Probability & Statistics	**Code**	BMAT202L
		Slot(s)	A2+TA2
Faculty	**Dr. Mohana N, Dr. S. Balaji, Dr. Om Namha Shivay, Dr. Dhivya P, Dr. Prosenjit Paul, Dr. Pulak Konar**	Class Nbr	**CH2022235000993, 998,996,994,995,997**
Time	90 minutes	**Max. Marks**	50

All five questions are mandatory.

Q. No.	Question Description	Marks
1	The sale of product in lakhs of rupees (Y) is expected to be influenced by two variables namely the advertising expenditure (X1) (in INR) and the number of sales persons (X2) in a region. Sample data on 8 regions of a state has given the following results. Find out the equation of the regression model.	10

Area	Y	X1	X2
1	110	30	11
2	80	40	10
3	70	20	7
4	120	50	15
5	150	60	19
6	90	40	12
7	70	20	8
8	120	60	14

2 i) If $\alpha = \frac{1}{3}$, and $\beta = \frac{1}{5}$, use Weibull distribution to find its mean, $P(X \leq 5)$ and $P(-3 < X < 3)$ 10

ii) The probability that a patient recovers from a rare blood disease is 0.4. If 15 people are known to have contracted this disease, what is the probability that (a) at least 10 survive, (b) from 3 to 8 survive, and (c) exactly 5 survive?

3 i) For the case of the thin copper wire, suppose that the number of flaws follows a Poisson distribution with a mean of 2.3 flaws per millimeter. Determine the probability of exactly 2 flaws in 1 millimeter of wire and also determine the probability of at least 1 flaw in 2 millimeters of wire. 10

ii) Find the mean deviation about the mean using normal distribution function?

4 A sample of 100 male students and a sample of 80 female students from the VIT Chennai campus were taken to compare the mean amount of time spent online, and the following results were obtained: 10

Male : $\bar{x} = 180\ mins, \quad s_1^2 = 30\ mins$

Female: $\bar{y} = 150\ mins, \quad s_2^2 = 25\ mins.$

i) Do the mean times spent on the internet differ significantly at the 0.05 level of significance?

ii) Also, obtain a 95% confidence interval for the difference of means $\mu_1 - \mu_2$.

5 a) In a random sample of 500 students from boys' hostel, 200 are found to be consumers of cheese Maggie from north square. However, a sample of 400 from girls' hostel, 200 are found to be consumers of cheese Maggie. Discuss whether the data reveal significant difference between boys' hostel and girls' hostel, so far as the proportion of cheese Maggie consumers are concerned. 5

b) Calculate the coefficient of rank correlation of the scores obtained by 7 students in an essay writing competition by two judges, X and Y. 5

X	13	10	18	14	16	18	24
Y	8	13	9	9	23	16	28