(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

THIRD SEMESTER [BCA] DECEMBER 2023-JANUARY 2024

Paper Code: BCA-201 ***Subject: Mathematics-III***

(BATCH 2011 ONWARDS)

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions. Use of calculator is allowed.

Q1 a) Find the missing frequency in the following distribution if N is 60, and the median is40. **(7.5)**

Marks	0 -10	10- 30	30 - 60	60 – 80	80 – 90
Frequency	5	F_1	F_2	8	2

b) Determine the standard deviation of first five natural numbers. **(7.5)**

Q2 a) Write the difference between PERT and CPM. Justify your answer with two examples of each. **(7.5)**

b) Find the coefficient of correlation for the data given in the following table. Also discuss the nature of the coefficient of correlation. **(7.5)**

Age (x)	43	21	25	42	57	59
Glucose Level(y)	99	65	79	75	87	81

Q3 a) Discuss Slack and Surplus variables with one example of each, also write the following linear programming problem in the standard form: Minimize $Z = 200x + 500y$, subject to the constraints:$x + 2y \geq 10$, $3x + 4y \leq 24$, $x \geq 0$, $y \geq 0$ **(8)**

b) Calculate the regression coefficient, and obtain the equations of the lines of regression for the following data **(7)**

HusbandsAge(x)	1	2	3	4	5	6	7
Wives' Age (y)	9	8	10	12	11	13	14

Q4 a) Write down the General Mathematical Model for an Assignment Problem. **(3)**

b) Discuss Degeneracy in transportation problem. **(4)**

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c) Solve the following Assignment problem by Hungarian Method, also find the total Assignment cost. **(8)**

Jobs/ Workers	A	B	C	D	E
I	9	22	58	11	19
11	43	78	72	50	63
III	41	28	91	37	45
IV	74	42	27	49	39
V	36	11	57	22	25

Q5 The repair of a certain type of machine require four steps to be completed one after another in a certain order. The time taken to perform each step follows exponential distribution with a mean of 5 minutes, and is independent of other steps. Machine breakdown follow Poisson process with mean rate of 3 breakdowns per hour. Answer the followings.

i) What is the expected Idle time of a machine assuming there is only one repairman available in repair workshop. **(5)**

ii) What is the average waiting time of a breakdown machine in the queue. **(5)**

iii) What is the expected number of break downs machine in the queue **(5)**

Q6 a) Solve the following Linear Programming Problem by Simplex Method.

Maximize $Z = x + 2y + 3z$, subject to : $x + y + z \leq 12$, $2x + y + 3z \leq 18$, $x, y, z \geq 0$ **(10)**

b) Compute the Coefficient of Rank correlation, between economics marks and statistics marks as given below. **(5)**

Eco Marks:	80	86	50	48	50	62	60
Stat Marks:	90	75	75	65	65	50	65

Q7 Find the Optimal Solution of The following Transportation Problem. Also find the total transportation cost. **(15)**

	D1	D2	D3	D4	D5	Supply
S1	3	4	6	8	9	20
S2	2	10	1	5	8	30
S3	7	11	20	40	3	15
S4	2	1	9	14	16	13
Demand	40	6	8	18	6	Total= 78

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Q8 a) Two samples of sizes 60 and 90 have 52 and 48 as the respective arithmetic means, and 9 and 12 as the respective standard deviations. Find standard deviation of the combine sample of the size 150. **(5)**

b) If the arrival and departure rates in a M/M/I queue are ½ per minute respectively, find the average waiting time of a customer in the queue. **(5)**

c) Discuss North West corner rule for transportation, and KPC for correlation. **(5)**

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