

**BCom DECREE EXAMINATION DECEMBER 2018**

(Third Semester)

Branch **e-COMMERCE****OPERATIONS RESEARCH**Time : Three **Hours**

Maximum : 75 Marks

**SECTION-A (20 Marks)**Answer **ALL** questions**ALL questions carry EQUAL marks**

(i 0 x 2 = ' 20)

- 1 Write the standard form of LPP in matrix form.
- 2 Define non-basic variables.
- 3 Define feasible solution, optimal solution of a transportation problem.
- 4 What is an unbalanced transportation problem'?
- 5 Define individual replacement.
- 6 Write the formula for average annual cost of replacement problem.
- 7 Define traffic intensity.
- 8 Define queuing.
- 9 Mention the three main managerial functions for an }/ project
- 10 Define activity.

**SECTION - B (25 Marks)**Answer **ALL** Questions**ALL Questions Carry EQUAL Marks (5 x 5 ~ 25)**

- 11 a Explain the mathematical formulation of a linear programming problem and the matrix formulation.

OR

- b Solve the following LPP by the graphical method

$$\text{Max } z = 3x_1 + 2x_2$$

$$\text{St., } x_1 + x_2 \leq 1$$

$$x_1 \leq 2$$

$$x_1, x_2 \geq 0$$

Explain the steps used to determine the initial solution for transportation problem by applying North West Corner rule.

OR

- b Solve the assignment, problem

	A	R	C	D
I	4	6	7	9
II	5	11	7	8
III	4	5	11	7
IV	8	i	8	8

- a Explain the various types of replacement decision with suitable examples.

OR

b A firm is considering replacement of a machine, whose cost price is Rs. 12.200 and the scrap value Rs.200. The running cost in rupees are found from experience to be as follows:

Year	1	2	3	4	5	6	7
Running cost :	200	500	800	1200	1800	2500	3200

When should the machine be replaced?

- 14 a A T.V repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they came in and if the arrival of sets is approximately Poisson with an average rate of 10/per 8 hours day. What is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in.

OR

- b Write a short note on sequencing problem.

- 15 a Distinguish between PERT and CPM.

OR

- b Construct the network for the project whose activities and their relationships are as given below.

Activities : A, D, E can start simultaneously

Activities : B, C, >A; G, F > D, C; H > E, F.

**SECTION - C 130 Marks)**

Answer any **THREE** Questions

**ALL** Questions Carry **EQUAL** Marks (**3 x 10 = 30**)

- 16 Using simplex method solve the following LPP:

$$\text{Max } Z = 2x_1 + 4x_2$$

$$\text{Subject to } x_1 + 4x_2 \leq 24$$

$$3x_1 + x_2 \leq 21$$

$$x_1, x_2 \geq 0$$

- 17 Find the optimal transportation cost of the following matrix using Vogel's Approximation method.

	A	B	C	D	E	Available
Pr	4		2	6	9	100
Factory Q	6	4	5	5	7	120
R	5	2	6	4	8	120
Demand	40	50	70	90	90	

- 18 An electron equipment contains 500 resistors. When any resistor fails, it is replaced. The cost of replacing a resistor individually is Rs. 20. If all the resistors are replaced at the same time, the cost per resistor is Rs.5. The

percentage of surviving  $S(i)$  at the end of month  $i$  the given below

Month (i)	0	1	2	3	4	5
$S(i)$	100	90	75	55	30	0

What is the optimum replacement plan?

- 19 Customers arrive at a sales counter handled by a single person according to Poisson process with a mean rate of 20 per hour. The time required to serve a customer has an exponential distribution with a mean of 100 seconds. Find the average waiting time of a customer. Also find the traffic intensity.

- 20 The following table indicates the details of project

Activity :	1-2	1-3	1-4	2-4	2-5	3-5	4-5
Optimistic time :	2	3	4	8	6	2	n
Most likely time :	4	4	5	9	8	3	5
Pessimistic time :	5	6	6	11	12	4	7

(a) Draw the network

(b) Find the critical path

(c) Determine the expected standard deviation of the completion time.

Z-Z-Z

END