

NOVEMBER/DECEMBER 2019

**BCA33 — RESOURCE MANAGEMENT
TECHNIQUES**

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is Operations Research?
2. Define slack and surplus Variables.
3. What is meant by balanced transportation problem?
4. Write down the restrictions in assignment problem
5. Define "ideal time" for a machine in n job-2 machines sequencing problem.
6. Define Total elapsed time.
7. Define Replacement of equipments that fails suddenly.
8. What you understand by Replacement problem?
9. When do you say an activity critical?
10. What is the expansion of EFT and LST?



SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain the main phases of Operation Research.

Or

- (b) A Person requires 10, 12 and 12 units of A, B, C respectively for his garden. A liquid product contains 5, 2 and 1 units of A, B and C per carton. If the liquid product sells for Rs.3 per jar and the dry product sells for Rs.2 per carton, how many of each should he purchase in order to minimize the cost and meet the requirement?

12. (a) Find the initial basic feasible solution to the following TP using North-West corner rule:

3	7	6	4	5
2	4	3	2	2
4	3	8	5	3
				Availability

3 3 2 2

Demand

Or

- (b) Solve the following Assignment problem.

	JOB				
A	1	2	3	4	5
B	10	3	3	2	8
C	9	7	8	2	7
D	7	5	6	2	4
E	3	5	8	2	4
	9	10	9	6	10

13. (a) List the basic assumptions underlying a sequence problem.

Or

- (b) For the following data to find the minimum total elapsed time and idle time on the machines M₁, M₂ and M₃

	J1	J2	J3	J4	J5	J6	J7	
	M1	3	8	7	4	9	8	7
Machines	M2	4	3	2	5	1	4	3
	M3	6	7	5	11	5	6	12

14. (a) A firm is considering replacement of a machine, whose cost price is rupees running Rs.12,000 and the scrap value is Rs.200. The running costs in rupees are found from experience to be as follows:

Year :	1	2	3	4	5	6	7	8
Running cost:	200	500	800	1200	1800	2500	3200	4000

when should the machine be replaced?

Or

- (b) Explain about the sudden failure.

15. (a) Differentiate between PERT and CPM.

Or

- (b) For a small project of 12 activities, the details are given below. Draw the network and compute earliest occurrence time, latest occurrence time, critical activities and project completion time:

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Dependence	-	-	-	BC	A	C	E	E	DFH	E	IJ	G
Duration (days)	9	4	7	8	7	5	10	8	6	9	10	2

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Solve the following LPP by graphical method.

$$\text{Maximize } X = 3x_1 + 4x_2$$

$$\text{Subject to } x_1 + x_2 \leq 450, 2x_1 + x_2 \leq 600; x_1, x_2 \geq 0.$$

17. Solve the following transportation problem.

	D_1	D_2	D_3	D_4	Supply
S_1	8	4	1	5	70
S_2	8	9	2	7	55
S_3	4	3	6	2	70
Demand	85	35	50	45	

18. Six jobs A,B,C,D,E and F have arrived at one time to be processed on a single machine. Assuming that no new jobs arrive thereafter, determine.

Job	A	B	C	D	E	F
Processing time (minutes)	7	6	8	4	3	5

- (a) Optimal sequence as per SPT rule.
 (b) Completion times of the jobs
 (c) Mean flow time
 (d) Average in-process inventory

19. Explain. the different categories involved in replacement models.

20. Three time estimates for various activities of a project are given below. Find the expected duration t_e and variance σ^2 for each activity. Find the critical path .what is the probability of completing the project in 24 days?

Activities: (1,2) (1,3) (2,3) (2,4) (2,5)

t_e : 3 1 6 0 2

t_m : 4 2 8 0 5

t_p : 5 3 10 0 8

Activities: (3,4) (4,7) (5,6) (5,7) (6,7)

t_e : 3 6 1 2 4

t_m : 5 9 1 5 8

t_p : 7 12 1 8 12

