

B.Com(A&F) DEGREE EXAMINATION, APRIL 2020
I Year II Semester
Operations Research

Time : 3 Hours

Max.marks :75

Section A ($10 \times 2 = 20$) Marks

Answer any **TEN** questions

1. Define operation research.
2. Define artificial slack variable.
3. Explain balanced transportation problem.
4. Explain unbalanced assignment problem.
5. Define independent float.
6. Write the formula to find the expected time estimate(T_e).
7. Find total float from the following:

EFT	LFT
20	20
25	30
30	30
8. Write the formula for the expected number of customers in the queue waiting to receive service.
9. Write the formula for the average number of customers in the waiting line.
10. Define decision tree.
11. Define finite game.
12. Define saddle point.

Section B ($5 \times 5 = 25$) Marks

Answer any **FIVE** questions

13. Solve the LPP graphically

$$\text{Max } Z = x + 3y$$

Subject to constraints: $2x + y \leq 20$;

$$x + 2y \leq 20;$$

$$x, y \geq 0$$

14. Find the initial solution for the transportation problem using Least Cost entry Method.

	S_1	S_2	S_3	Availability
W_1	5	4	3	6
W_2	4	7	6	8
W_3	2	5	8	12
W_4	8	6	7	4
Requirement	8	10	12	30

15. Five jobs 1;2;3;4 and 5 are to be assigned to the five persons V W X Y and Z

The time taken in minutes by each of them on each job is given below:

	1	2	3	4	5
V	16	13	17	19	20
W	14	12	13	16	17
Y	5	5	8	8	11
Z	5	3	8	8	10

Work out the optimal assignment and the total minimum time taken.

16. The activities of a project have the following PERT time estimates

Job	1-2	7-8	2-3	3-5	5-8	6-	4-5	2-4	1-6
Optimistic time	3	4	6	5	1	3	3	2	2
Most likely time	6	19	12	11	4	9	6	5	5
Pessimistic time	15	28	30	17	7	27	15	8	14

(i) Draw the network diagram and determine the critical path.

(ii) Find the project completion time and its variance.

17. A TV repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come in and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 hour day

(i) how many jobs are ahead of the set just brought in?

(ii) what is the repairman's expected idle time each day?

18. Explain M/M/1; ∞ /FIFO model.

19. Using the principle of Dominance solve the following game

8	10	9	14
10	11	8	12
13	12	14	13

Section C ($2 \times 15 = 30$) Marks

Answer any **TWO** questions

20. Solve the following linear programming problem by simplex method.

$$\text{Minimise } Z = 16x_1 + 16x_2$$

$$\text{Subject to constraints: } 2x_1 + 4x_2 \geq 3;$$

$$3x_1 + 2x_2 \geq 4;$$

$$x_1; x_2 \geq 0$$

21. (a) Solve the following transportation problem (10 marks)

	1	2	3	4	a_i
A	10	18	11	7	20
B	9	12	14	6	40
C	8	9	12	10	35
b_j	16	18	31	30	

(b) Find the optimal solution for the assignment problem with the following cost matrix (5 Marks)

	W	X	Y	Z
A	11	17	8	16
B	9	7	12	6
C	13	16	15	12
D	14	10	12	11

22. A project has the following time schedule.

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Time in months	2	2	1	4	8	5	3	1	5	4	3

(i) Construct the network

(ii) Find the total float for each activity

(iii) Find the critical path and the project duration.

23. Reduce the following game to 2x2 game and hence find the optimum strategies and the value of the game.

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8