B.Com(A&F) DEGREE EXAMINATION,APRIL 2019
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 Constrains.
2. What is Operations Research?
3. What is Assignment problem?
4. What is Transportation problem?
5. Find the solution of the following transportation problem using least cost method.

				Demand
	2	1	3	10
	4	5	7	20
	1	8	6	15
Supply	12	18	15	

6. Define Network.
7. Define Activity.
8. Draw the network for the corresponding following project.

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
Duration(day)	2	4	3	1	6	5	7

9. Write any two principles of queuing system.
10. What is FIFO?
11. Define game.
12. Solve the following game.

$$\begin{array}{cc} & \text{Player B} \\ & \begin{matrix} B_1 & B_2 & B_3 \end{matrix} \\ \text{Player A} \begin{matrix} A_1 \\ A_2 \\ A_3 \end{matrix} & \begin{pmatrix} 1 & 3 & 1 \\ 0 & -4 & -3 \\ 1 & 5 & -1 \end{pmatrix} \end{array}$$

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

Answer any **FIVE** questions

13. Write the limitation of operations research.

14. Solve graphically,

    Minimize $z = 4x_1 + 2x_2$

    Subject to $x_1 + 2x_2 \geq 2$

    $3x_1 + x_2 \geq 3$

    $4x_1 + 3x_2 \geq 6$

    and $x_1,\ x_2 \geq 0$.

15. Find the starting solution of the following transportation by North- West corner rule.

				Supply
	20	10	15	200
	10	12	9	300
	25	30	18	500
Demand	200	400	400	

16. Find the transportation cost using VOGEL's approximation method.

				Demand
	5	7	8	70
	4	4	6	30
	6	7	7	50
Supply	65	42	43	

17. A project consists of the following activities and different time estimates.

Activity	Least time (days)	Greatest time (days)	Most likely time(days)
1-2	3	15	6
1-3	2	14	5
1-4	6	30	12
2-5	2	8	5
2-6	5	17	11
3-6	3	15	6
4-7	3	27	9
5-7	1	7	4
6-7	2	8	5

i. Draw the network.

ii. Find the expected task times.

iii. Find the critical path.

18. In a super market the average arrival rate of a customer is $\frac{10}{30}$ minute following poisson process. The average time taken by the cashier to list and calculate the customers purchase is 2.5 minutes following exponential distribution. What is the probability that queue size exceeds 6? What is the expected time spent by a customer in the system?

19. Solve the following 2×2 game.

$$\begin{array}{cc} & \text{Player B} \\ & \begin{array}{cc} B_1 & B_2 \end{array} \\ \text{Player A} \begin{array}{c} A_1 \\ A_2 \end{array} & \begin{pmatrix} 5 & 1 \\ 3 & 4 \end{pmatrix} \end{array}$$

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

Answer any **TWO** questions

20. Solve by simplex method.

Maximize $z = 5x + 4y$

Subject to $4x + 5y \leq 10$, $3x + 2y \leq 9$,

$8x + 3y \leq 12$

and $x,\ y \geq 0$.

21. Solve the following assignment problem.

$$\begin{array}{c} \\ J_1 \\ J_2 \\ J_3 \\ J_4 \\ J_5 \end{array} \begin{array}{c} \begin{array}{ccccc} M_1 & M_2 & M_3 & M_4 & M_5 \end{array} \\ \begin{pmatrix} 7 & 5 & 9 & 8 & 11 \\ 9 & 12 & 7 & 11 & 10 \\ 8 & 5 & 4 & 6 & 9 \\ 7 & 3 & 6 & 9 & 5 \\ 4 & 6 & 7 & 5 & 11 \end{pmatrix} \end{array}$$

22. Calculate the total float of the activities.

Activity	t_0	t_m	t_p
1-2	1	2	3
2-3	1	2	3
2-4	1	3	5
3-5	3	4	5
4-5	2	3	4
4-6	3	5	7
5-7	4	5	6

6-7	6	7	8
7-8	2	4	6
7-9	4	6	8
8-9	1	2	3
9-10	3	5	7

23. Solve the following game using dominance property

$$\begin{array}{cc} & \text{Player B} \\ & \begin{array}{ccc} B_1 & B_2 & B_3 \end{array} \\ \text{Player A} \begin{array}{c} A_1 \\ A_2 \\ A_3 \end{array} & \begin{pmatrix} 1 & 7 & 2 \\ 6 & 2 & 7 \\ 6 & 1 & 6 \end{pmatrix} \end{array}$$