# 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 operations research.
2. What is objective function?
3. What is transportation problem?
4. Define feasible solution for transportation problem.
5. Find the transportation using North West Corner rule.

| | | | | Demand |
|---|---|---|---|---|
| | 2 | 7 | 4 | 5 |
| | 3 | 3 | 1 | 8 |
| | 5 | 4 | 7 | 7 |
| | 1 | 6 | 2 | 14 |
| Supply | 7 | 9 | 18 | |

6. What is Assignment problem?
7. What is unbalanced assignment problem?
8. Write mathematical formulation of an assignment problem.
9. What is project?
10. Draw a network, for the following data

| Activity | Time in weeks |
|---|---|
| 1-2 | 4 |
| 1-3 | 2 |
| 1-4 | 10 |
| 2-5 | 12 |
| 3-5 | 6 |
| 2-6 | 12 |
| 5-6 | 9 |
| 4-6 | 8 |

11. Write any three basic characteristic of a queuing system.
12. What is FIFO?

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

Answer any **FIVE** questions

13. Write the scope of operations research.

14. Solve the following LPP using graphical method

    Maximize $z = 5x_1 + 3x_2$

    Subject to $3x_1 + 5x_2 \leq 15$

    $5x_1 + 2x_2 \leq 10$ and $x_1,\ x_2 \geq 0$.

15. Find the initial basic solution of the following transportation least cost method.

| | | | | Supply |
|---|---|---|---|---|
| | 6 | 1 | 2 | 10 |
| | 4 | 3 | 0 | 8 |
| | 5 | 7 | 9 | 2 |
| | 4 | 2 | 1 | 5 |
| Demand | 10 | 12 | 3 | |

16. A project has the following characteristics

MEN

| TASKS | 1 | 2 | 3 |
|---|---|---|---|
| A | 9 | 26 | 15 |
| B | 13 | 27 | 6 |
| C | 35 | 20 | 15 |
| D | 18 | 30 | 20 |

| Activity | Duration(Weeks) | Predecessors |
|---|---|---|
| A | 6 | None |
| B | 8 | A |
| C | 4 | A |
| D | 9 | B |
| E | 2 | C |
| F | 7 | D |

Construct the network and compute the critical path and project duration.

17. Find the optimal assignment cost.

$$\begin{array}{c} \\ A \\ B \\ C \\ D \\ E \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{pmatrix} 13 & 8 & 16 & 18 & 19 \\ 9 & 15 & 24 & 9 & 12 \\ 12 & 9 & 4 & 4 & 4 \\ 6 & 12 & 10 & 8 & 13 \\ 15 & 17 & 18 & 12 & 20 \end{pmatrix} \end{array}$$

18. Draw the critical path and find the total duration of the project is given by

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

19. In a public telephone booth the arrivals are on the average 15/hour. A call on the average takes 3 min. If there is just one phone find,

i. Expected number of callers in the booth at any time.

ii. The proportion of the time the booth is expected to be idle.

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

Answer any **TWO** questions

20. Use simplex method to solve the LPP

Maximize $z = 4x_1 + 10x_2$

Subject to $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$

and $x_1,\ x_2 \geq 0.$

21. Find the optimal transportation cost.

| | | | | Demand |
|---|---|---|---|---|
| | 5 | 1 | 7 | 10 |
| | 6 | 4 | 6 | 80 |
| | 2 | 1 | 5 | 15 |
| Supply | 45 | 20 | 40 | |

22. Solve the assignment problem.

$$\begin{array}{c} \\ J_1 \\ J_2 \\ J_3 \\ J_4 \\ J_5 \end{array} \begin{array}{c} \begin{array}{ccccc} M_1 & M_2 & M_3 & M_4 & M_5 \end{array} \\ \begin{pmatrix} 13 & 8 & 16 & 18 & 19 \\ 9 & 15 & 24 & 9 & 12 \\ 12 & 9 & 4 & 4 & 4 \\ 6 & 12 & 10 & 8 & 13 \\ 15 & 17 & 18 & 12 & 20 \end{pmatrix} \end{array}$$

23. The utility data for a network is given below. Determine the total, free, independent floats and identify the critical path.

| Activity | Duration |
|---|---|
| 0-1 | 2 |
| 1-2 | 8 |
| 1-3 | 10 |

| | |
|---|---|
| 2-4 | 6 |
| 2-5 | 3 |
| 3-4 | 3 |
| 3-6 | 7 |
| 4-7 | 5 |
| 5-7 | 2 |
| 6-7 | 8 |