B.B.A. DEGREE EXAMINATION,APRIL 2019
III Year V 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. State the characteristics of Operation Research.
3. State limitations of Operation Research.
4. Define linear programming problem..
5. Define slack variable.
6. State the necessary and sufficient condition for the existence of feasible solution to a transportation problem:
7. Define assignment problem.
8. Define dummy activity.
9. What are the three time estimates used in PERT.
10. Explain decision tree.
11. Define game theory.
12. What is meant by saddle point in game theory.

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

Answer any **FIVE** questions

13. Explain in detail about the scope of Operations Research.
14. State the advantages of linear programming problem.
15. A firm user lathes, milling Machines and grinding Machines to produce two Machines parts. Table given below Represent the Machine time required for each part, The Machine time available on different Machines and the profit on each Machine part. Formulate into LPP.

Types of Machines	Machine time required for the Machine part(minute).	Maximum Time available per week(minute).

	I	II	
Lathes	12	6	3,000
Milling Machines	4	10	2,000
Grinding Machines	2	3	900
Profit per unit	40	100	

16. Solve the following transportation problem using NORTH WEST CORNER method.

FACTORIES	WARE HOUSE			
	W1	W2	W3	Supply
S1	2	7	4	5
S2	3	3	1	8
S3	5	4	7	7
S4	1	6	2	14
Demand	7	9	18	

17. State the difference between CPM and PERT.

18. 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

19. Solve the following game.

Player A	Player B			
	B1	B2	B3	B4
A1	0	-1	3	5
A2	-5	-2	4	5
A3	-2	-3	-4	-2

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

Answer any **TWO** questions

20. Solve the following LPP using simplex method.

    Max Z=$4X_1 + 7X_2$

    Subject to $4X_1 + 3X_2 = 12$

    $3X_1 + 4X_2 = 12$

    $X_1, X_2 = 0$

21. Solve the following assignment problem.

Typist	Job			
	P	Q	R	S
A	15	27	35	20
B	21	29	33	17
C	17	25	37	15
D	15	31	39	21

22. A project has the following characteristics and time estimates - optimistic time (a) most likely time (m) and pessimistic time (b). Construct a pert network. Find the critical path and the project duration.

Activity	a	b	c
1-2	1	5	1.5
2-3	1	3	2
2-4	1	5	3
3-5	3	5	4
4-5	2	4	3
4-6	3	7	5
5-7	4	6	5
6-7	6	8	7
7-8	2	6	4
7-9	4	8	6
8-10	1	3	2
9-10	3	7	5

23. Explain in detail about the methods for decision making under uncertainty.