B.Sc. DEGREE EXAMINATION,APRIL 2020
III Year V Semester
Operations Research - II

Time : 3 Hours **Max.marks :60**

Section A $(10 \times 1 = 10)$ Marks

Answer any **TEN** questions

1. What is a slack variable?
2. Define a Liner programming problem
3. What do you understand by unbalanced transportation problem?
4. Define degeneracy in transportation problem
5. What is an assignment problem?
6. What is a critical path?
7. What do you mean by network?
8. Write the formula to compute the standard normal deviate for the probability of completing the project
9. What is individual replacement policy?
10. How are items classified in replacement problem?
11. What is dual simplex method?
12. What is the use of least cost method in transportation problem?

Section B $(5 \times 4 = 20)$ Marks

Answer any **FIVE** questions

13. Write the dual of the Linear programming problem

    Minimize Z $=4X_1+6X_2+18X_3$
    Subject to $X_1+3X_2 \geq 3$
    $X_2+2X_3 \geq 5$
    $X_1, X_2, X_3 \geq 0$

14. Obtain the initial basic feasible solution using North-west corner rule for the following transportation problem

	D	E	F	G	Availability
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

15. Write a brief note on travelling salesman problem
16. Give any four rules while constructing the network
17. Construct the network diagram comprising activities A,B,C,D,E,F,G,H,I,J,K and L such that the following relationships are satisfied (i) A,B and C, the first activities of the project can start simultaneously
    (ii) A and B precede D
    (iii) B precede E, F and H
    (iv) F and C precede G
    (v) E and H precede I and J
    (vi) C,D,F and I precede K
    (vii) K precede L
    (viii) I,G and L are the terminal activities of the project
18. Explain replacement policy when the value of money does not change with time for continuous time point.
19. Write a short note on slack and float in a network problem

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Use simplex method to solve the following linear programming problem
    Maximize Z= $5X_1+4X_2$
    Subject to $4X_1+5X_2 \leq 10$
    $3X_1+2X_2 \leq 9$
    $8X_1+3X_2 \leq 12$
    X_1,$X-2 \geq 0$
21. Find the initial basic feasible solution to the following transportation using Vogel's approximation method. Also use MODI method to find the optimum solution.

		Destination				
Source		1	2	3	4	Availability
	1	21	16	25	13	11
	2	17	18	14	23	13
	3	32	27	18	41	19
Requirement		6	10	12	15	43

22. A departmental head had four subordinates, and four tasks to be performed. The subordinates differ in efficiency, and the tasks differ in their intrinsic difficulty. His estimate, of the time each man would take to perform each task, is given below

		Men			
		E	F	G	H
	A	18	26	17	11
Tasks	B	13	28	14	26
	C	38	19	18	15
	D	19	26	24	10

How should the task be allocated one to a man so as to minimize the total man hours?

23. A project schedule has the following characteristics

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

(i) Construct PERT network
(ii) Compute the earliest start and latest finish times
(iii) Find the critical path

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

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

When should the machine be replaced?