

K23U 0518

Reg.	No.	:	 ••	•••	 	•••	 •••	••	 •••	••	 ••
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VI Semester B.Sc. Degree (CBCSS – OBE-Regular/Supplementary/ Improvement) Examination, April 2023 (2019 and 2020 Admissions) DISCIPLINE SPECIFIC ELECTIVE IN MATHEMATICS 6B14BMAT : Operations Research

Time : 3 Hours

Max. Marks: 48

SECTION - A

Answer any 4 questions out of 5 questions. Each question carries 1 mark.

- 1. Define convex set.
- 2. Define a balanced transportation problem.
- 3. Write the basic terms used in sequencing problem.
- 4. State the max-min principle.
- 5. Define degenerate solution of an LPP.

 $(4 \times 1 = 4)$

SECTION - B

Answer any 8 questions out of 11 questions. Each question carries 2 marks.

- 6. Write the quadratic form $x_1^2 + 8x_1x_2 + 16x_2^2 3x_3^2$ in the form x^TAx .
- 7. Wfite the procedure for graphical method in linear programming problem.
- 8. Write the dual of the linear programming problem

. Maximize $Z = 4x_1 + 2x_2$

subject to $x_1 + x_2 \ge 3$, $x_1 - x_2 \ge 2$, x_1 , $x_2 \ge 0$.

P.T.O.

 $(8 \times 2 = 16)$

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- 9. Explain North West Corner method.
- 10. Explain duality in transportation problem.
- 11. Explain mathematical formulation of Assignment problem.
- 12. Write the optimal sequence algorithm for n jobs on k machines.
- 13. Explain maintenance crew scheduling.
- 14. Write the rules for determining a saddle point.
- 15. Explain pure strategy and mixed strategy.
- 16. Define standard form of an LPP.

SECTION - C

. . . .

Answer any 4 questions out of 7 questions. Each question carries 4 marks.

- 17. Determine whether the quadratic form $x_1^2 + 2x_2^2 + 2x_3^2 2x_1x_2 2x_2x_3$ is positive definite.
- 18. An animal feed company must produce 200 lbs of a mixture containing the ingredients X₁ and X₂. X₁ costs Rs. 3 per lbs and X₂ costs Rs. 8 per lbs. Not more than 80 lbs of X₁ can be used and minimum quantity to be used for X₂ is 60 lbs. Find how much of each ingredient should be used if the company wants to minimize the cost. Formulate the problem mathematically.
- 19. Obtain an initial basic feasible solution using least cost method.

-	D ₁	D ₂	D ₃	D ₄	Capacity
0 ₁	1	. 2	3	4	6
0,	4	3	2	0	8
0 ₃	0	2	2	1	10
Demand	4	6	8	6	

20. Write the algorithm to compute the initial basic feasible solution using VAM.

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21. A department head has four tasks to be performed and three subordinates, the subordinates differ in efficiency. The estimates of time each subordinate would take to perform, is given below in the matrix. How should he allocate the tasks one to each man, so as to minimize the total man hours ?

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Task	Men					
	1	2	3			
1	9	26	15			
11	13	27	6			
111	35	20	15			
IV	18	30	20			

22. Solve the following sequencing problem when passing out is not allowed.

Item	Machine (Processing time in hours)							
	Α	В	C	D				
1	15	5	4	15				
II	12	2	10	12				
	16	-3	5	16				
IV	017 0	3	4	17				

23. Solve the following 2 person zero sum game.



 $(4 \times 4 = 16)$

SECTION - D

Answer any two questions out of 4 questions. It carries 6 marks.

24. Use simplex method to maximize $Z = x_1 + 2x_2 + 3x_3$ subject to $x_1 + 2x_2 + 3x_3 \le 10$, $x_1 + x_2 \le 5$, $x_1, x_2, x_3 \ge 0$.

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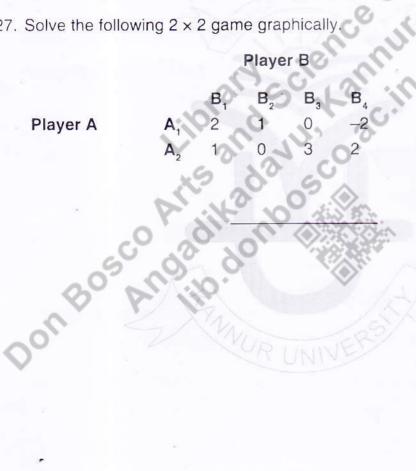
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25. Solve the following transportation problem.

From		То	Available	
	Α	В	С	,
	6	8	4	14
11	4	9	. 8	12
III	<u>1</u>	2	6	5
Requirement	6	10	15	

26. Write the optimum sequence algorithm for n jobs on 2 machines.

27. Solve the following 2×2 game graphically



(2×6=12)