Basavarajeswari Group of Institutions

2024 SCHEME

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN											Course Code	M	B	A	2	0	4

Second Semester MBA Degree Examinations, August/September 2025

OPERATIONS RESEARCH

Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any* FOUR *full questions from Question No. 1 to 7.***
2.Question No. 8 is compulsory
3. Missing data, if any, may be suitably assumed

Q. No		*Question*	*Marks*	*(RBTL:CO:PO)*
1.	**a.**	What are the usefulness of the objective function in LPP?	**03**	**(2:1:2)**
	b.	What are the salient characteristics of operations research? Derive the usefulness of it.	**07**	**(2:1:2)**
	c.	What are different of phases in operation research, write its application.	**10**	**(3:1:2)**
2.	**a.**	Analyse the concept of optimal solution. Illustrate with example.	**03**	**(3:1:2)**
	b.	Analyse critically to formulation the below problem in LPP format **ONLY**: Anita electrical company produces two products P_1 & P_2. Products are produced and sold on weekly basis. The weekly production cannot exceed 25 for product P_1 and 35 for product P_2 because of limited available facilities. The company employs total of 60 workers. Product P_1 requires 2 man-week of labour, while P_2 requires one man-week of labour. Profit margin on P_1 is R_S.60 and on P_2 is R_S.40.	**07**	**(3:2:2)**
	c.	Analyse the following linear programming problem graphically. Minimize $Z_{Min} = 5\boldsymbol{x} + 8\boldsymbol{y}$ subject to constraints $\boldsymbol{12x + 2y \geq 42}$ $\boldsymbol{x + 3y \geq 12,}$ $\boldsymbol{x + y \leq 10}$ $\boldsymbol{x \geq 0, y \geq 0.}$	**10**	**(4:2:4)**
3.	**a.**	Briefly examine the key elements of a decision making theory.	**03**	**(2:1:5)**
	b.	Evaluate the concept of decision under uncertainty- Max min & Min max, illustrate with example.	**07**	**(4:2:3)**
	c.	Write the steps in simulation by Monte Carlo technique, write you conclusion of the technique.	**10**	**(4:2:4)**
4.	**a.**	Design the transportation problem by **LEAST COST METHOD to find IBFS**(Initial Basic Feasible Solution)	**03**	**(3:2:3)**

	D1	**D2**	**D3**	**Supply**
S1	7	6	9	20
S2	5	7	3	28
S3	4	5	8	17
Demand	21	25	19	

	b.	Design the transportation problem by transportation problem by **NORTH WEST CORNER** method **to find** IBFS(Initial Basic Feasible Solution)	**07**	**(3:3:4)**

	D1	**D2**	**D3**	**D4**	**Supply**
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PO – Programme Outcome)

c. Design the transportation problem by using **VAM** for feasible solution. **10** **(5:3:4)**

	D1	**D2**	**D3**	**Supply (S)**
S1	4	8	8	76
S2	16	24	16	82
S3	8	16	24	77
Demand (D)	72	102	41	**215**

5. a. Design the significance of pure strategy and mixed strategy appropriate business situation **03** **(3:3:4)**

b. Design the value of the game by using dominance property for two players A and B with the payoff Matrix **07** **(3:4:2)**

		Player *B*		
		***B*1**	***B*2**	***B*3**
Player *A*	***A*1**	10	5	-2
	***A*2**	13	12	15
	***A*3**	16	14	10

c. A political party has to contest election in five constituencies. It has five contestants and thinking of which contestant to contest in which constituency. It has estimated the chances of winning on a 14 point scale. The chance of winning of each contestant in each constituency is given in the following matrix. **Design** the assignment of which contestant has to contest in which constituency so as to maximize the chance of winning. **10** **(3:4:2)**

		Constituency				
Contestant		**D1**	**D2**	**D3**	**D4**	**D5**
	A	5	11	10	12	4
	B	2	4	6	3	5
	C	3	12	5	14	6
	D	6	14	4	11	7
	E	7	9	8	12	12

6. a. Write frame work for phases of project management-planning, scheduling, controlling phase in project management. **03** **(3:4:2)**

b. Construct the networking diagram with (i) Activity on Arrow (AOA) for overview of the project. **07** **(3:5:2)**

S.No.	1	2	3	4	5	6	7	8	9	10	11
Activity	A	B	C	D	E	F	G	H	I	J	K
Immediate Predecessor Activity	-	-	A	B	B	A	C	D	A	E,G,H	F,I,J

c. Design the project network diagram and determine the critical path and duration and free, total and independent float for the data given below: **10** **(3:5:2)**

S.N	1	2	3	4	5	6
Activity	1-2	2-3	2-4	3-5	4-5	5-6
Duration D_{ij}	3	4	5	4	8	6

7. a. What is zero sum game in game theory? Evaluate its significance **03** **(4:6:4)**

b. Design the solution of game theory problem using **dominance** method **07** **(4:6:4)**

		Player *B*		
		***B*1**	***B*2**	***B*3**
Player *A*	***A*1**	1	7	2
	***A*2**	6	2	7
	***A*3**	5	1	6

c. Design a game strategy by considering the payoff matrix of Player A. as shown below and solve it optimally using **graphical method**. **10** **(5:6:4)**

		Player B	
		1	2
Player A	1	6	-7
	2	1	3
	3	3	1
	4	5	-1

8. **Case Study** **20** **(5:5:5)**

Design the transportation problem by using **VAM** for feasible solution. Find the optimal Solution by using **MODI method.**

	D1	**D2**	**D3**	**D4**	**Supply (S)**
S1	13	7	19	0	200
S2	17	18	15	7	500
S3	11	22	14	5	300
Demand (D)	180	320	100	400	—

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