22 BA 301 :: OPERATIONS RESEARCH (4L + 1T + 1P)

Course Code	**22 BA 301**	Course Delivery Method	Class Room / Blended Mode
Credits	**4**	CIA Marks	30
No. of Lecture Hours / Week	05	Semester End Exam Marks	70
Total Number of Lecture Hours	75	Total Marks	100
Year of Introduction :2008	Year of Offering :2019	Year of Revision :	Percentage of Revision :

Course Objective: Ability to understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively. Knowledge of formulating mathematical models for quantitative analysis of managerial problems in industry, Skills in the use of Operations Research approaches and computer tools in solving real problems in industry, Mathematical models for analysis of real problems in Operations Research.

Course Outcomes:

CO-1**:** To provide students with knowledge of formulating mathematical model for quantitative analysis of managerial problems in industry.
CO-2: To imparts skills in the use of network models in solving real problems in industry and business.
CO-3: To develop the ability to identify transportation and assignment models in solving real business problems.
CO-4: To understand the significance of game theory and decision theory models for facilitates the managerial decision-making.
CO-5: To enable the students understand the queuing and simulation concepts that yield a competitive advantage through operational excellence.

COURSE CONTENT

Unit I

Operations Research and Linear Programming Problem: Introduction, Uses, Scope, and Applications of Operation Research in Managerial Decision-making - O.R. Models - Formulation of Models - Using Models for Problem Solving-Techniques of Operations Research - Limitations of Operations Research – Linear Programming: Mathematical Formulations of LP Models for Product-mix Problems-Graphical Method-Simplex Method and its Applications**.** **(18 Hours)**

Unit II

Duality and Network Techniques: Duality in Linear Programming - Technical Issues in Simplex Method - Project Management - Network Models: PERT, and CPM and its Applications**.** **(15 Hours)**

Unit III

Transportation & Assignment Problem: Transportation-Introduction - Methods for Finding Initial Solution - Optimum Solution-MODI Method - Assignment Problem- Introduction-Hungarian Method. **(15 Hours)**

Unit IV

Game Theory & Decision Theory: - Introduction - Two Person Zero sum games - Pure and Mixed Strategies - Dominance Principles - Graphical method - Decision Theory and its Applications. **(14 Hours)**

Unit V

Queuing Theory &Simulation: Queuing model (M / M / I ONLY): Components, Basic Structure, and Assumptions - waiting line Decision Problem - Simulation: Types, Random variable, Monte-Carlo Technique. **(13 Hours)**

Reference Books:

1. S.D.Sharma., Operation Research Theory, Methods & Applications, 17th Revised Edition,(2014) KedarNathRamnath, New Delhi.
2. Kantiswarup, P.K.Gupta and Manmohan, Operations Research, 15th Edition (2010) Sultan Chand & Sons New Delhi.
3. Kapoor, V.K., Operation Research Techniques for Management, 4th Edition, (2001), Sultan Chand & Sons, New Delhi.
4. Sharma, J. K., Operation Research - Theory and Applications, 5th Edition (2013) MacMillan.
5. R. Paneerselvam, Operation Research – 2nd Edition,(2009) PHI learning private ltd.,

Course Focus:Foundation **/ E**mployability.

MODEL QUESTION PAPER
M.B.A. (REGULAR) DEGREE EXAMINATION
Third Semester
22 BA 301 :: OPERATIONS RESEARCH
(2020-2021 Regulation Onwards)

Time: Three hours **Maximum Marks: 70**

SECTION A – (5X4 = 20 Marks)

Answer the Following Questions

Write Short Notes on:

1. a) Scope of O.R. (CO1) (L2)
   (OR)
   b) Slack and Surplus variables (CO1) (L2)
2. a) Total and free floats(CO2)(L2)
   (OR)
   b) Duality in L.P (CO3)(L2)
3. a) Unbalanced Assignment Problem(CO 3)(L2)
   (OR)
   b) Unbalanced Transportation Problem (CO3)(L2)
4. a) Pure and Mixed Strategy(CO 4)(L2)
   (OR)
   b) Decision Theory (CO 4)(L2)
5. a) Characteristics of a queuing system (CO5)(L2)
   (OR)
   b)Simulation(CO5)(L2)

SECTION- B

(5X8 = 40 Marks)

Answer All Questions.

2. a) Solve by Graphical method(CO 1)(L 3)
(i) Maximise z= 5x1+7x2
Subject to constraints:
2x1+3x2<=15
2x1+ x2<=12
x1+3x2<=10, and x1,x2>=0.

Or

b) Solve the following problem by using Big M method(CO 1)(L3)
Maximize Z = 3 x1 + 2x2 +3x3
Subject to constraints:
2x1 +3x2 >= 24
3x1 + x2 >= 12
2x1+2 x2>=16, and x1,x2>=0.

3. a) One unit of A contributes Rs. 7 as profit and requires 3 units of Raw material and 2 hours of labour. One unit of product B contributes Rs. 5 as profit and requires 2 units of raw material and one hour labour. Availability of raw material at present is 45 units and that of labour as 40 hours. Formulate it as linear programming problem and write its dual.(CO 2)(L6)

Or

b) Explain briefly the network models and its applications?(CO 2)(L2)

4.a) Solve the following transportation problem starting with the initial solution obtained by VAM(CO 3)(L3)

	D1	D2	D3	D4	Supply
O1	2	2	2	1	3
O2	10	8	5	4	7
O3	7	6	6	8	5
Required	4	3	4	4	

Or

b) A company has 4 machines to do 3 jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given below. Determine the job assignments which will minimize the total cost.(CO 3)(L5)

	M1	M2	M3	M4
Job 1	18	24	28	82
Job 2	8	18	17	18
Job 3	10	15	19	22

5.a) Solve the following game using principle of dominance(CO 4)(L3)

Player B

B1 B2 B3 B4 B5 B6

	A1	4	2	0	2	1	1
	A2	4	3	1	3	2	2
Player A							
	A3	4	3	7	-5	1	2
	A4	4	3	4	-1	2	2
	A5	4	3	3	-2	2	2

Or

b) A and B play a game in which each has three coins, a 5 paise, a 10 paise and a 20 paise. Each selects a coin without the knowledge of the others choice. If the sum of the coins thus elected by them is an odd amount, A wins B's coin. If the sum is even B wins A's coin. Find the best strategy for each player and the value of the game.(CO 4)(L1)

6. (a)A TV repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8-hour day, what is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in?(CO 4)(L1)

Or

(b) What is simulation? Discuss the advantages and limitations of Simulation.(CO 5)(L1)

SECTION C – (Compulsory) **1X10 = 10 Marks**

7. Construct the Network for the following Project and determine the following :(CO 2)(L3)

(i) Critical Path

(ii) Earliest Slack, Earliest Finish, Latest Slack, Latest Finish

(iii) Total Float, Free Float.

Activity	1-2	2-3	2-4	3-5	3-6	4-6	4-7	5-8	6-8	7-8
Duration	2	3	5	4	1	6	2	8	7	4

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