RAYALA SEEMA UNIVERSITY: KURNOOL

SEMESTER-WISE REVISED SYLLABUS UNDER CBCS, 2020-21

Three year B.A./B.Sc

Domain Subject: STATISTICS (WM)

SEMESTER-V

Course 7A: **OPERATIONS RESEARCH - II**

(Skill Enhancement Course(Elective), 05 Credits

Max. Marks: Theory :100 + Practicals:50)

(Hours: Teaching:75 hrs, Training: 15 hrs)

Objective: To enrich the knowledge of students with advanced techniques of linear programming problem along with real life applications.

Learning Outcomes:

After learning this course, the student will be able

1. To solve the problems in logistics
2. To find a solution for the problems having space constraints
3. To minimize the total elapsed time in an industry by efficient allocation of jobs to the suitable persons.
4. To find a solution for an adequate usage of human resources
5. To find the most plausible solutions in industries and agriculture when a random environment exists.

UNIT -I

Transportation Problem- Introduction, Mathematical formulation of Transportation problem. Definition of Initial Basic feasible solution of Transportation problem- North-West corner rule, Lowest cost entry method, Vogel's approximation method.

Method of finding optimal solution-**MODI method (U-V method)**, Unbalanced transportation problem. Maximization TP

UNIT-II

Assignment Problem-Introduction, Mathematical formulation of Assignment problem, Reduction theorem (statement only), Hungarian Method for solving Assignment problem, Unbalanced Assignment problem.

The Traveling salesman problem- Formulation of Traveling salesman problem as an Assignment problem and Solution procedure.

UNIT-III

Sequencing problem- Introduction and assumptions of sequencing problem, Johnson's algorithm for n jobs and two machines problem- problems with n-jobs on two machines, Gantt chart, algorithm for n jobs on three machines problem- problems with n- jobs on three machines

UNIT-IV

Network Scheduling- Basic Components of a network, nodes and arcs, events and activities– Rules of Network construction – Time calculations in networks - Critical Path method **(CPM)** and **PERT**.

UNIT-V

Game theory- Two-person Zero-sum games, Pure and Mixed strategies, Maximin and Minimax Principles, Saddle point and its existence, Games without saddle point-Mixed strategies, Solution of 2 x 2 Games, Graphical method of solving 2xn and mx2 games(Algorithm only), Dominance property

Reference Books:

1. S.D. Sharma, Operations Research, Kedar Nath Ram Nath & Co, Meerut.
2. Kanti Swarup, P.K.Gupta, Manmohn, Operations Research, Sultan Chand and sons, New Delhi.
3. J.K. Sharma, Operations Research and Application, Mc. Millan and Company, New Delhi.
4. Gass: Linear Programming. Mc Graw Hill.
5. Hadly :Linrar programming. Addison-Wesley.
6. Taha : Operations Research: An Introduction : Mac Millan.
7. Dr.NVS Raju; Operations Research, SMS education
8. S.Kalavathy: Operations Research: Vikas Publications

Practical/Lab to be performed on a computer using OR/Statistical packages

Conduct at least 6 Practicals from the following

1. IBFS of transportation problem by using North- West corner rule, Matrix minimum method and VAM
2. Optimum solution to balanced and unbalanced transportation problems by MODI method (both maximization and minimization cases)
3. Solution of Assignment problem using Hungarian method (both maximization and minimization cases),
4. Solution of sequencing problem—processing of n jobs through two machines
5. Solution of sequencing problem- processing of n jobs through three machines
6. To perform Project scheduling of a given project (Deterministic case-CPM).
7. To perform Project scheduling of a given project (Probabilistic case-PERT).
8. Solution of m x n games by dominance rule.

RAYALA SEEMA UNIVERSITY: KURNOOL
THREE YEAR B.A./B.Sc DEGREE EXAMINATION
(W.E.F 2020-21 ADMITTED BATCH)

STATISTICS(WM)

(SKILL ENHANCEMENT COURSES)
SEMESTER – V

Course 7A: OPERATIONS RESEARCH -II

Time: 3 Hours **Max. Marks : 70**

PART-A

Answer any FIVE Questions : **5 X 4 = 20M**

1. Explain the Mathematical formulation of a Transportation problem
2. Explain Least Cost method for obtaining IBFS of a Transport Problem
3. Explain Mathematical formulation of travelling salesman problem as Assignment problem
4. Mention the basic assumptions underlying a Sequencing Problem
5. Explain Principle Steps in solving ‘n jobs on 2 machines’
6. Explain the rules of Network Construction
7. Explain the terms ‘Pure strategy’, Mixed strategy’, and ‘Pay off matrix’ in game theory
8. Explain Dominance property in game theory

PART –B

Answer any FIVE Questions :- **5 X 10 = 50M**

9. Find the IBFS for the following transportation problem by North-West Corner Method

Origin/Destination	1	2	3	4	Supply
1	11	13	17	14	250
2	16	18	14	10	300
3	21	24	13	10	400
Demand	200	225	275	250	

10. Find the IBFS by VAM and also determine the optimal solution by MODI method for the following Transportation Problem

Plant/Distribution centre	D1	D2	D3	D4	Supply
P1	19	30	50	12	7
P2	70	30	40	60	10
P3	40	10	60	20	18
Requirement	5	87	15	35	

11. Describe Hungarian method to solve Assignment Problem
12. Solve the following Assignment problem using Hungarian method

	1	2	3	4
1	18	26	17	11
2	13	28	14	26
3	38	19	18	15
4	19	26	24	10

13. Find the sequence that minimizes the total elapsed time required to complete thefollowing jobs. Also find Idle times

Books	1	2	3	4	5	6	7
Printing time	3	12	15	6	10	11	9
Binding time	8	10	10	6	12	1	3

14. Find the sequence that minimizes the total time required for performing the following jobs on three machines in the order ABC.

Job	Processing times		
	Machine A	Machine B	Machine C
1	8	3	8
2	3	4	7
3	7	5	6
4	2	2	9
5	5	1	10
6	1	6	9

15. Explain various basic steps in CPM /PERT
16. A Project schedule has the following characteristics

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

From the above information find a)Construct a network diagram

b) Compute the earliest time and latest event time

c) Determine the critical path and total project duration

d) Compute total and free float for each activity

17. Explain the Maximin and Minimax Principle used in Game theory with example
18. Solve the following Pay off matrix. Also determine the optimum strategies and the value of the game

$$\begin{array}{cc} & B \\ A & \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix} \end{array}$$