| *DEPARTMENT OF INFORMATION TECHNOLOGY* | | | | *CLASS: I B.Sc. Information Technology* | | | | |
|---|---|---|---|---|---|---|---|---|
| **Sem.** | **Course Type** | **Course Code** | **Course Title** | **Credits** | **Contact Hours/week** | **CIA** | **Ext** | **Total** |
| II | Allied-2 | 20U2FAC2 | Resource Management Techniques | 5 | 6 | 25 | 75 | 100 |

***Course Objectives:***

1. To gain the Knowledge of making Linear programming problems from Real time situations.
2. To apply simplex methods and its variants to solve the variety of Complex problems.
3. To acquire the benefits of allocating works using Transportation & Assignment problems.
4. To solve the problems using different strategies using Games.
5. To simplify the development work / project by planning with the help of Networking.

**Unit-I: Linear Programming Problem – I**

Mathematical Formulation of the problem – Graphical Solution – Introduction- Graphical Solution Method – Some exceptional cases- General L.P.P. – Canonical and Standard forms of L.P.P.

**Unit-II: Linear Programming Problem – II**

Simplex Method – Introduction – Fundamental Properties of Solutions – The computational procedure – Use of Artificial Variable. Duality in linear programming – Introduction – The general Primal-Dual pair – Formulating a dual problem – Duality and Simplex method.

**Unit-III: Transportation and Assignment problem**

Transportation Problem – Introduction – General Transportation Problem – The transportation table – Solution of a Transportation problem – Finding an initial basic feasible solution – Test for optimality – Transportation Algorithm (MODI method). Assignment Problem – Introduction – Mathematical formulation of the problem – The assignment method – Special cases in assignment problems – A typical assignment problem – The traveling salesman problem.

**Unit-IV: Game Theory**

Introduction – Two-person zero-sum games – Some basic terms – The Maxmin-Minimax principle – Games without Saddle points-mixed strategies – Graphic solution of 2 x n and m x 2 games – Dominance property – Arithmetic method for n x n games.

**Unit-V: Network Scheduling**

Introduction – Network and basic components – Logical sequencing – Rules of network Construction – Critical path analysis – Distinction between PERT and CPM.

**Books for Study**

1. Kanti Swarup, P.K. Gupta, Man Mohan – "Operations Research" – 18th edition, Sultan Chand & Sons Educational Publishers, New Delhi.

   **Chapters:**

   Unit – I : 2.1 – 2.3, 3.1 - 3.5

   Unit – II : 4.1 - 4.4, 5.1 – 5.3, 5.7

Unit – III: 10.1, 10.2, 10.5, 10.8 - 10.10, 10.13, 11.1 - 11.5, 11.7.
Unit – IV : 17.1 - 17.8.
Unit – V : 25.1 - 25.4, 25.6, 25.8.

**Books for Reference**


1. Hamdy A. Taha – "Operations Research an Introduction" – PHI, 8th edition.
2. S.D. Sharma – "Operations Research" – 12th edition, Kedar Nath Ram Nath & Co Publishers, Meerut.


**Web Resources**

1. https://www.mathcity.org/msc/notes/operation_research
2. http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdf

**Pedagogy**

Chalk and talk , Materials, Assignment , Seminar , Problem solving , Group discussion, and Interaction.

**Course Learning Outcomes:**

On the completion of the course the student will be able to

| CLOs | Course Learning Outcomes | K -Level |
|---|---|---|
| CLO1 | List the rules for formulating LPP. Apply the rules to formulate the mathematical formulation. Find the solution for Graphical method problems. Discuss the Canonical and standard forms. | Up To K3 |
| CLO2 | Describe the steps of computing Simplex method. Illustrate the usage of various simplex methods. Outline the duality principles and solve the problems by applying simplex methods. | Up To K3 |
| CLO3 | Explain various ways to find Initial BFS for transportation problem. Classify the various problem solving techniques in Assignment methods. Find solution for traveling salesman problem. | Up To K4 |
| CLO4 | Outline the strategies used in Games. Solve the games using graphical method and Dominance theory. Describe Arithmetic method. | Up To K3 |
| CLO5 | Discuss the network components, Construction rules. Examine the Critical path in network construction. Relate PERT and CPM. | Up To K4 |

**Mapping of CLOs with POs:**

| CLOs/ POs | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|
| CLO1 | 3 | 3 | 1 | NA | 3 |
| CLO2 | 3 | 2 | NA | NA | 1 |
| CLO3 | 3 | 3 | NA | 3 | 2 |
| CLO4 | 3 | 2 | 1 | NA | 2 |
| CLO5 | 3 | 3 | NA | 3 | 3 |

3- Advanced Application; 2- Intermediate Level; 1- Basic Level; N/A- Not Applicable

**Mapping of CLOs with PSOs:**

| CLOs/ PSOs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CLO1 | 3 | N/A | N/A | N/A | N/A | N/A |
| CLO2 | 3 | 1 | N/A | N/A | N/A | N/A |
| CLO3 | 3 | 3 | 3 | 2 | 3 | 2 |
| CLO4 | 3 | 2 | 1 | N/A | 2 | 3 |
| CLO5 | 3 | 3 | 3 | 1 | 3 | 3 |

3- Advanced Application; 2- Intermediate Level; 1- Basic Level; N/A- Not Applicable

**Learning Outcome Based Education & Assessment (LOBE)**
**Blue Print for Summative Examination - Resource Management Techniques**
**Articulation Mapping – K Levels with Course Learning Outcomes (CLOs)**

| Sl.No | CLOs | K - Level | Section A | | Section B | | Section C (Either/ or Choice) | Section D (Open Choice) |
|---|---|---|---|---|---|---|---|---|
| | | | MCQs | | Short Answers | | | |
| | | | No. of Questions | K - Level | No. of Questions | K - Level | | |
| 1 | CLO 1 | Up to K 3 | 2 | K1 & K2 | 1 | K1 | 2(K1 & K1) | 1(K3) |
| 2 | CLO 2 | Up to K 3 | 2 | K1 & K3 | 1 | K3 | 2(K3 & K3) | 1(K2) |
| 3 | CLO 3 | Up to K 4 | 2 | K1 & K2 | 1 | K1 | 2(K2 & K2) | 1(K4) |
| 4 | CLO 4 | Up to K 3 | 2 | K1 & K2 | 1 | K2 | 2(K3 & K3) | 1(K1) |
| 5 | CLO 5 | Up to K 4 | 2 | K1 & K3 | 1 | K3 | 2(K4 & K4) | 1(K3) |
| No. of Questions to be asked | | | 10 | | 5 | | 10 | 5 |
| No. of Questions to be answered | | | 10 | | 5 | | 5 | 3 |
| Marks for each question | | | 1 | | 2 | | 5 | 10 |
| Total Marks for each section | | | 10 | | 10 | | 25 | 30 |

K1 – Remembering and recalling facts with specific answers
K2 – Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving Problems
K4 – Examining analyzing, presentation and make inferences with evidences

**Distribution of Section-wise Marks with K Levels**

| K Level | Section A (No Choice) | Section B (No Choice) | Section C (Either/or) | Section D (Open Choice) | Total Marks | % of Marks without choice | Consolidated |
|---|---|---|---|---|---|---|---|
| K1 | 5 | 4 | 10 | 10 | 29 | 24.17 | 45% |
| K2 | 3 | 2 | 10 | 10 | 25 | 20.83 | |
| K3 | 2 | 4 | 20 | 20 | 46 | 38.33 | 38% |
| K4 | - | - | 10 | 10 | 20 | 16.67 | 17% |
| **Total Marks** | 10 | 10 | 50 | 50 | 120 | 100.00 | 100% |

**Lesson Plan:**

| Units | Topics to be Covered | Hours | Mode |
|---|---|---|---|
| I | Mathematical Formulation of the problem – Graphical Solution – Introduction- Graphical Solution Method. | 7 | Lecture |
| | Some exceptional cases- General L.P.P. – Canonical and Standard forms of L.P.P. | 7 | Lecture |
| | Various problems discussions | 4 | Lecture, GD |
| II | Simplex Method – Introduction – Fundamental Properties of Solutions – The computational procedure | 6 | Lecture |
| | Use of Artificial Variable. Duality in linear programming – Introduction | 7 | Lecture |
| | The general Primal-Dual pair – Formulating a dual problem – Duality and Simplex method. | 5 | Lecture, GD |
| III | Transportation Problem – Introduction – General TP– The transportation table – Solution of a Transportation problem – Finding an initial BFS. | 6 | Lecture |
| | Test for optimality – Transportation Algorithm (MODI method). Assignment Problem – Introduction – Mathematical formulation of the problem. | 6 | Lecture |
| | The assignment method – Special cases in assignment problems – A typical assignment problem – The traveling salesman problem. | 6 | Lecture |
| IV | Introduction – Two-person zero-sum games – Some basic terms – The Maxmin-Minimax principle. | 6 | Lecture, Power Point |
| | Games without Saddle points-mixed strategies – Graphic solution of 2 x n and m x 2 games. | 7 | Lecture & GD |
| | Dominance property – Arithmetic method for n x n games. | 5 | Lecture & GD |
| V | Introduction – Network and basic components – Logical sequencing. | 5 | Lecture, PPT |
| | Rules of network Construction – Critical path analysis. | 7 | Lecture, GD |
| | Distinction between PERT and CPM and discussing various problems. | 6 | Lecture, Assignment |

**Name of the Course Designers:**

1. Mrs. S. Rajalakshmi
2. Mrs. R. Tamilselvi