Integrated MCA II Semester 4

Subject Name: Operation Research **Subject Code:** IMCA14409

Type of course: Professional Elective Course

Prerequisite (if any):

- Mathematical Fundamentals

Rationale: Data structure and algorithms help in understanding the nature of the problem at a deeper level. This helps the graduate to write efficient code while developing solutions to the problems in computer science.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks		Practical Marks		Total
L	T	P	C	TEE	CAT	TEP	CAP	
2	1	0	3	60	40	0	0	100

CAT: Continuous Assessment Theory comprised of CA1 and CA2 **CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CAP:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Content	Teaching Hrs.	Module Weightage
1	**Linear Programming Problem (Formulation, graphical method)** Model examples on Formulation of LP Problems (LPP), Graphical solution of two variable problems, Graphical solution of Properly Behaved LP Problems, Graphical solution in some Exceptional cases, Application of LP on management accounts, Important Geometric properties of LP problems General form of Linear programming problem, Slack and Surplus variables, Standard form of LPP, Matrix form of LPP, Some important definitions, Assumptions in LPP, Limitations of Linear Programming, Applications of Linear Programming, Advantages of Linear Programming techniques **Simplex method:** Some more definitions and notations, Computational procedure of Simplex Method, Simple way for simplex method computations, Tips for quick solution	10	30%
2	**Transportation Problem** Introduction, Mathematical Model of Transportation Problem, The Transportation Method, Methods for Finding Initial Solution, North-West Corner Method ,Vogel's Approximation Method, Test for Optimality, Dual of Transportation Model	10	30%
3	**Assignment Problem** Introduction, Mathematical Statement of the Problem, Solution Methods of Assignment Problem Enumeration Method, Simplex Method, Transportation Method, Hungarian Method Variations of the Assignment Problem, Multiple Optimal Solutions, Maximization Case in Assignment Problem, Travelling Salesman Problem	5	20%
4	**Project management by PERT-CPM** Introduction, Historical Development of PERT/CPM techniques, Application of PERT/CPM techniques, Basic steps in PERT/CPM techniques, Network diagram Representation, Rules for Drawing Network Diagram, Common errors in drawing networks, Labelling Fulkerson's I-J rule …, Time estimates and Critical path in network	5	20%

	analysis, Examples on Optimum Duration and minimum duration cost, Project Evaluation and Review Technique (PERT), Illustrative examples of PERT		

Suggested Specification table with Marks (Theory):

%Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	10	25	25	30	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr. no.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Operations research- Theory and Applications,	J. K. Sharma	Macmillan business books	-	2nd Edition
2.	Operation Research	S. D. Sharma	Knrn	-	15th Edition
3.	Operation Research-An Introduction	Hamdy A Taha	Pearson	-	10th Edition

Course Outcomes:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % Weightage
CO-1	Find solution of linear programming problems by graphical method and simplex method	30
CO-2	Learn different types of transportation problems	30
CO-3	Solve different types of assignment problems	20
CO-4	Learn different methods to find critical path	20

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13
CO-1	3	1	1	1	2	0	1	0	1	0	1	2	1
CO-2	3	1	1	1	2	0	1	0	1	0	1	2	1
CO-3	3	1	1	1	2	0	1	0	1	0	1	2	1
CO-4	3	1	1	1	2	0	1	0	1	0	1	2	1
Rationale*													

Rationale*: Explaining why it is matching this particular program outcome

List of Open learning website: NA

List of Open-Source Software: NA

Major Equipment Needed: NA