Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
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COURSE PLAN & COURSE DATA SHEET

PROGRAM: MCA	DEGREE: MCA
COURSE: Operational Research and Optimization	SEMESTER: IV CREDITS: 3
COURSE CODE: MCA 209 REGULATION: Regular	COURSE TYPE: CORE /ELECTIVE / BREADTH/ S&H
COURSE AREA/DOMAIN:	CONTACT HOURS: 3+1 (Tutorial) hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY): No	LAB COURSE NAME (IF ANY):No

PROGRAM EDUCATIONAL OBJECTIVES:

1. Develop in to social responsible and value driven people who are committed to long term development
2. To make managerial decision, develop a creative imaginative and entrepreneur mentaliy.
3. Ability to adapt rapidly evolving, dynamic, market climate and a desire to learn new skill.
4. Provide advanced management skill for work and life learning.

SYLLABUS:

UNIT	DETAILS	HOURS
I	Basic definition, Scope, Objectives, Phases characteristics and phases and limitations of Operation Research-Types of models-Operations Research, Models- applications. Allocation: Linear Programming Problem Formulation-Formulation, Graphical solution- Simplex Method-Artificial variable techniques: Two-phase method, Big-M method.	10
II	Transportation problem – Formulation-Optimal solution, unbalanced transportation problem- Degeneracy. Assignment Model- Formulation-Optimal solution, – Variants of Assignment problemTravelling salesman problem.	9
III	Sequencing Models- Introduction-Flow-Shop sequencing- n jobs through two machines – n jobs through three machines- Job shop sequencing-two jobs through 'm' machines. Replacement Models: Introduction- Replacement of items that deteriorate with time- when money value is not counted and counted- Replacement of items that fail completely- Group Replacement.	10
IV	Theory of Games: Introduction- Terminology- Solution of games with saddle points and without saddle Points. 2 x 2 games- dominance principle- m x 2 & 2 x n games- Graphical	10

	method. Inventory: Introduction- Single item, Deterministic models- purchase inventory models with one price break and multiple price breaks- Stochastic models _ Demand may be discrete variable or continuous variable- single period model and no setup cost.	
V	Dynamic Programming: Introduction- Terminology, Bellman's principle of optimality-Applications of Dynamic programming- shortest path problem- linear programming problem. Inventory Models: Inventory cost, models with deterministic demand-model(a) demand rate uniform and production rate infinite, model (b) demand rate non-uniform and production rate infinite, model(c)demand rate uniform and production rate finite.	8
	Total Hours	**47**

Teacher Centric Approach **TC1: Chalk and Talk, TC2: PPT, TC3: Video Lectures TC4:Blended learning**
Learner Centric Approach: **LC1: Assignment. LC2: Mini project. LC3: Quiz/Class test. LC 4: Seminar on recent trends.** **LC5: Group Task. LC6: Others**

DETAILED SESSION PLAN

Lecture session/ Number	Topics to be covered	CO addressed	Teacher Centric Approach	Learner Centric Approach	References	Relevance with POs and PSOs
1.	Basic definition, Scope, Objectives	CO1	TC2	LC3	T1	PO1/PSO1
2.	Phases characteristics and phases	CO1	TC2	LC5	T1/T2	PO1/PSO1
3.	Types of models-Operations Research.	CO1	TC2	LC3	T1/T2	PO2/PSO2
4.	Allocation: Linear Programming Problem	CO1	TC2	LC5	T1/T2	PO3/PSO2
5.	Formulation, Graphical solution	CO1	TC2	LC3	T1/T2	PO4/PSO1
6.	Simplex Method-Artificial variable techniques	CO1	TC2	LC5	T1/T2	PO6/PSO2
7.	Two-phase method, Big-M method	CO1	TC2	LC3	T1/T2	PO4/PSO2
8.	Two-phase method, Big-M method	CO1	TC2/TC1	LC5	T1/T2	PO6/PSO1
9.	Problem Solving session	CO1	TC2/TC1	LC3	T1/T2	PO3/PSO2
10.	Assignment and discussion of Problems on Unit 1	CO1	TC2/TC1	LC5	T1/T2	PO5/PSO2
11.	Transportation problem – Formulation Basic	CO2	TC2/TC1	LC3	T1/T2	PO6/PSO2

12.	N/W Corner rule, Least cost Entry Method.	CO2	TC2/TC1	LC5	T1/T2	PO2/PSO1
13.	Vogels approximation method VAM.	CO2	TC2/TC1	LC3	T1/T2	PO5/PSO1
14.	Basic and Feasible Solution by VAM Method	CO2	TC2/TC1	LC5	T1/T2	PO2/PSO1
15.	Optimality test of Transportation Problem.	CO3	TC2/TC1	LC3	T1/T2	PO1/PSO2
16.	Problem discussion on transportation Problem.	CO3	TC2/TC1	LC5	T1/T2	PO1/PSO1
17.	Assignment Problem: Formulation and Basic	CO3	TC2/TC1	LC3	T1/T2	PO1/PSO2
18.	Solution of Assignment Problem Using Hungarian	CO3	TC2/TC1	LC5	T1	PO1/PSO1
19.	Problem discussion on Assignment Problem	CO3	TC2/TC1	LC3	T1	PO1/PSO1
20.	Travelling salesman problem.	C03	TC1	LC5	T1/T4	PO1/PSO1
21.	Sequencing Models-Introduction-Flow-	CO3	TC2/TC1	LC3	T1	PO1/PSO1
22.	n jobs through three machines	CO3	TC2/TC1	LC5	T1/T3	PO3/PSO2
23.	Job shop sequencing-two jobs through 'm'	CO3	TC2/TC1	LC3	T1/T2	PO1/PSO1
24.	Replacement Models: Introduction	CO3	TC2/TC1	LC5	T1	PO1/PSO1
25.	Replacement of items that deteriorate with	CO3	TC2/TC1	LC3	T1/T3	PO1/PSO2
26.	when money value is not counted and	CO3	TC2/TC1	LC5	T1/T4	PO1/PSO2
27.	Group Replacement.	CO3	TC2/TC1	LC3	T1/T4	PO1/PSO1
28.	Group Replacement.	CO3	TC2/TC1	LC5	T1	PO3/PSO1
29.	Assignment on unit 3	CO4	TC2/TC1	LC3	T1	PO4/PSO1
30.	Theory of Games: Introduction-	CO4	TC2/LC3	LC5	T1	PO2/PSO1
31.	Solution of games with saddle points and	CO4	TC2/TC1	LC3	T1	PO3/PSO1
32.	2 x 2 games-dominance principle	CO4	TC2/TC1	LC5	T1	PO4/PSO1
33.	- m x 2 & 2 x n games-Graphical method	CO4	LC5/TC1	LC3	T1/T2	PO6/PSO1
34.	Inventory: Introduction-Single item	CO4	TC2/TC1	LC5	T1/T2	PO5/PSO1
35.	Deterministic models-purchase inventory	CO4	TC2/TC1	LC3	T1	PO5/PSO1
36.	Deterministic models-purchase inventory	CO4	TC2/TC1	LC5	T1/T3	PO3/PSO1
37.	Stochastic models _ Demand may be	CO5	TC1	LC3	T1/T2	PO4/PSO1

38.	continuous variable-single period model and	CO5	TC2/TC1	LC5	T1	PO6/PSO1
39.	Problem solution session.	CO5	TC2/TC1	LC3	T1	PO5/PSO1
40.	Dynamic Programming: Introduction and	CO5	TC2/TC1	LC5	T1	PO4/PSO1
41.	Bellman's principle of optimality-Applications	CO5	TC2/TC1	LC3	T1/T4	PO3/PSO1
42.	linear programming problem	CO5	TC2/TC1	LC5	T1/T2	PO2/PSO1
43.	linear programming problem	CO5	TC2/TC1	LC3	T1/T3	PO3/PSO2
44.	Inventory Models: Inventory cost, models	CO5	TC2/TC1	LC3	T1/T3	PO3/PSO2
45.	demand rate uniform and production rate infinite,	CO5	TC2/TC1	LC3	T1/T3	PO3/PSO2
46.	demand rate non-uniform and production rate	CO5	TC2/TC1	LC3	T1/T3	PO3/PSO2
47.	demand rate uniform and production rate finite	CO5	TC2/TC1	LC3	T1/T3	PO3/PSO2

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
1	Tulsian, P. C., Vishal Pandey, Quantitative Techniques – Theory and Problems, Pearson Publications, 2006.
2	Shankar P. Iyer, Operations Research, Tata McGraw-Hill Education, 2008
3	Hamdy A. Taha, Operations Research-An introduction, Pearson Education, 8th Edition / Prentice Hall of India, 2007.
4	Ravindra, Don T. Phillips and James J. Solberg, Operations Research Principles and Practice, John Wiley and Sons, 2nd edition, 2000.
5	

 # WEB SOURCE REFERENCES (W):

1	https://www.worldscientific.com
2	https://www.sciencedirect.com

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
	There are no specific prerequisites for this course. However, a basic understanding of Optimization Techniques for Managers would be beneficial and Basic Linear programming	**Discuss Basic concept of LPP, Equations and optimization techniques**	

COURSE OBJECTIVES:

1	Formulation of a Linear programming problem.
2	Solve the formulation of LPP
3	. Evaluate the initial solution for the Transportation Model.
4	Evaluate the solution for the Assignment Problem.
5	Minimize the waiting hours of simultaneous projects undertaken.
6	Explain the different network models

COURSE OUTCOMES:

S.NO	DESCRIPTION	PO (1..,12) MAPPING	PSO (1..,2) MAPPING
Cxxx.1	Discuss about operations research, history and application	PO 1	PSO1
Cxxx.2	Discuss linear programming Problems and its applications	PO2	PSO2
Cxxx.3	Practical Solution of Assignment Problems & Transportation Problems through various methods	PO2	PSO2
Cxxx.4	Practical Problems and solution of job sequencing problems & Replacement Models	PO3	PSO1
Cxxx.5	Practical Problems and solution of job sequencing problems & Replacement Models	PO4	PSO2

COURSE OUTCOMES VS POs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1**):**

S.NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Cxxx.1	3	2	1	2	1	3	2	2					1	2	
Cxxx.2	2	3	2	1	1	2	2	1					1	2	
Cxxx.3	2	2	3	1	1	3	1	1					1	2	
Cxxx.4	2	2	3	2	1	1	1	1					1	1	
Cxxx.5	2	1	2	2	1	2	1	2	1	1			1	1	
Cxxx*															

** For Entire Course, PO & PSO Mapping*

POs & PSO REFERENCE:

PO1	Engineering Knowledge	PO7	Environment & Sustainability	PSO1	Achieve a solid foundation in the field of fiancé and accounting.
PO2	Problem Analysis	PO8	Ethics	PSO2	Possess adequate knowledge skills and experimental learning in the field of commerce education
PO3	Design & Development	PO9	Individual & Team Work	PSO3	
PO4	Investigations	PO10	Communication Skills		
PO5	Modern Tools	PO11	Project Mgt. & Finance		

PO6	Engineer & Society	PO12	Life Long Learning		

COs VS POs MAPPING JUSTIFICATION:

S.NO	PO/PSO MAPPED	LEVEL OF MAPPING	JUSTIFICATION
Cxxx.1			
Cxxx.2			
Cxxx.3			
Cxxx.4			
Cxxx.5			
Cxxx*			

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS, POs & PSOs:

SNO	DESCRIPTION	PROPOSED ACTIONS
1		
2		
3		
4		
5		

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

 # TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

1	
2	
3	
4	
5	
6	
7	

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

☐ CHALK & TALK	☐ STUD. ASSIGNMENT	☐ WEB RESOURCES	☐ NPTEL/OTHERS
☐ LCD/SMART BOARDS	☐ STUD. SEMINARS	☐ ADD-ON COURSES	☐ WEBNIARS

ASSESSMENT METHODOLOGIES-DIRECT

☐ ASSIGNMENTS	☐ STUD. SEMINARS	☐ TESTS/MODEL EXAMS	☐ UNIV. EXAMINATION
☐ STUD. LAB PRACTICES	☐ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

☐ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	☐ STUDENT FEEDBACK ON FACULTY (TWICE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

 # INNOVATIONS IN TEACHING/LEARNING/EVALUATION PROCESSES:

1.
2.
3.
4.
5.

Prepared by
(Prof. Vijay Vir Singh)

Approved by
(HOD)

 # Additionally, the details to be compiled separately by the Departmental Coordinator for the entire Department.