DEPARTMENT OF PRODUCTION TECHNOLOGY

MADRAS INSTITUTE OF TECHNOLOGY CAMPUS

ANNA UNIVERSITY : : CHENNAI – 600 044.

COURSE PLAN

COURSE DETAILS:

Degree	B.E.		
Programme Name	Production Engineering		
Course Code & Title	GE5002/ QUANTITATIVE TECHNIQUES IN MANAGEMENT		
Credits	3	Session	January – May 2024
Course Type	Theory/ ~~Theory with Lab/ Lab~~	Section	6th semester
Name of the Faculty	Mr.K.Muthukumaran Teaching Fellow Department of Production Technology MIT, Anna University, Chennai – 600044.		

COURSE CONTENT:

Syllabus: (Approved Syllabus as per Regulation 2019)

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
- To familiarize the students with concepts of Linear Programming
- To introduce the replacement models to students
- To enable the students to utilize the queuing models for application to waiting line problems.
- To stress importance of inventory management and their use in industry.
- To familiarize project network and decision tree problems to students so that they can use them in project management.

UNIT I LINEAR PROGRAMMING   9
Problem formulation - Graphical method – simplex method- Big M method- Two Phase Method– Dual Simplex method- Special cases of LP– transportation model- assignment model – applications.

UNIT II REPLACEMENT MODELS AND GAME THEORY   9
Basic replacement model – individual replacement and group replacement problems – applications – game theory – terminology – decision criteria – solution to a 2 x 2 and 2 x n games – applications of LP in game theory – applications.

UNIT III QUEUING MODELS AND SIMULATION   9
Elements of queue – queue discipline – Poisson arrival and exponential service – queue length – waiting time – steady state conditions – applications – concept of simulation – Monte Carlo method – applications.

UNIT IV FORECASTING, SEQUENCING AND LINE BALANCING   9
Forecasting – purpose – methods – measures of forecast error; scheduling – priority rules - sequencing – methods of sequencing – Johnson's rule – Heuristic approach, line balancing – applications.

UNIT V PROJECT NETWORK ANALYSIS AND DECISION TREE ANALYSIS   9
Network – CPM/PERT – Project time estimation – critical path – crashing of network, Decision tree analysis – applications

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
- Use the simplex method to solve problems in industry
- Identify a suitable replacement model so that replacement of equipment can be done optimally

- Utilize the knowledge on queuing models and sequencing in production systems
- Identify inventory model for a specific industry
- Select a suitable project network technique for project management

TEXT BOOKS:
1. Hamdy A.Taha, "Operations Research – An Introduction", Prentice Hall of India, 8th edition 2008.
2. Panneerselvam R., "Operation Research", Prentice Hall of India, 2008

REFERENCES:
1. Guptha.P.K. and Man-Mohan, "Problems in Operations Research", Sultan chand and Sons, 2014.
2. Monks. J.G, "Operations Management theory and Practice", McGraw Hill, 2nd edition 1996.
3. Ravindran, Philips and Sojberg, "Operations Research Principles and Practice", John Wiley and Sons, Singapore, 2nd edition, 2007.
4. Sharma J.K., "Operations Research Theory and Applications", Macmillan India Ltd., 4th edition, 2009.
5. Kothari DP, Awari G K, "Quantitative Techniques in Business, Management and Finance", CRC Press, Taylor and Francis Group, 2016.

COURSE ARTICULATION MATRIX

GE5002/ QUANTITATIVE TECHNIQUES IN MANAGEMENT

Course Outcome	Statement	Programme Outcomes												Programme Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Use the simplex method to solve problems in industry	3	2	-	1		-	-			1		1	1	1	1
CO2	Identify a suitable replacement model so that replacement of equipment can be done optimally	3	2	-	1		-	-			1		1	1	1	1
CO3	Utilize the knowledge on queuing models and sequencing in production systems	3	2	-	1		-	-			1		1	1	1	1
CO4	Identify inventory model for a specific industry	3	2	-	2		1	1			1		1	1	2	1
CO5	Select a suitable project network technique for project management	3	2	1	2		-	-			1		1	1	2	1
	PO & PSO (Average)	3.0	2	1	1.4	-	1	1	-	-	1	-	1	1	1.4	1

COURSE ALIGNED PROGRAMME OUTCOMES (PO) & PROGRAMME SPECIFIC OUTCOMES (PSO)

PO	Graduate Attribute	Programme Outcome
1	Engineering knowledge	Apply knowledge of mathematics, basic science and engineering science.
2	Problem analysis	Identify, formulate and solve engineering problems.
3	Design/development of solutions	Design a system or process to improve its performance, satisfying its constraints.
4	Conduct investigations of complex problems	Conduct experiments & collect, analyze and interpret the data.
5	Modern tool usage	Apply various tools and techniques to improve the efficiency of the system.
6	The Engineer and society	Conduct selves to uphold the professional and social obligations.
7	Environment and sustainability	Design the system with environment consciousness and sustainable development.
8	Ethics	Interacting industry, business and society in a

9	Individual and team work	Function in a multidisciplinary team.
		professional and ethical manner.
10	Communication	Proficiency in oral and written Communication.
11	Project management and finance	Implement cost effective and improved system.
12	Life-long learning	Continue professional development and learning as a life-long activity.

PSO	Graduates demonstrate
1	Knowledge on Production system: Familiarization of basic and advanced systems and practices.
2	Knowledge on design, analysis and development: Familiarization of system for Production processes, automation and quality systems.
3	Foundation of continuous improvement: Knowledge on application of appropriated materials, production processes and production system and development of an optimal solution to achieve continuous improvement to cater the needs of industry and society.

COURSE TENTATIVE SCHEDULE / PLAN

Week	Day	Date	Hrs	Unit	Topics	Text / Ref.
1	Tues	23-01-24	5	1	Problem formulation - Graphical method	T1,R4
	Thurs	25-01-24	3,4	1	Simplex method & Big M method	T2,R4
2	Tues	30-01-24	5	1	Two Phase Method	T1,R4
	Thurs	01-02-24	3,4	1	Dual Simplex	T2,R4
3	Tues	06-02-24	5	1	Special cases of LP	T2,R4
	Thurs	08-02-24	3,4	1	Transportation model - Application	T1,R4
4	Tues	13-02-24	5	1	Assignment model - Application	T2,R4
	Thurs	15-02-24	3,4	2	Basic replacement model	T2,R4
5	Tues	20-02-24	5	2	Individual replacement Problems	T1,R4
	Thurs	22-02-24	3,4	2	Group replacement problems	T2,R4
6	Tues	27-02-24	5	2	Game theory – terminology – decision criteria	T2,R4
	Thurs	29-02-24	3,4	2	Solution to a 2 x 2 and 2 x n games	T2,R4
7	Tues	04-03-24	5	2	Applications of LP in game theory – applications	T1,R4
	Thurs	07-03-24	3,4	3	Elements of queue – queue discipline	T2,R4
8	Tues	12-03-24	5	3	Poisson arrival and exponential service	T2,R4
	Thurs	14-03-24	3,4	3	Queue length – waiting time – steady state conditions	T1,R4
9	Tues	19-03-24	5	3	Concept of simulation	T2,R4

	Thurs	21-03-24	3,4	3	Monte Carlo method – applications	T1,R4
10	Tues	26-03-24	5	4	Forecasting – purpose – methods	T2,R4
	Thurs	28-03-24	3,4	4	Measures of forecast error	T2,R4
11	Tues	02-04-24	5	4	Scheduling – priority rules	T1,R4
	Thurs	04-04-24	3,4	4	Sequencing – methods of sequencing – Johnson's rule	T2,R4
12	Tues	09-04-24	5	4	Johnson's rule based Problems	T2,R4
	Thurs	11-04-24	3,4	4	Heuristic approach	T1,R4
13	Tues	16-04-24	5	4	Line balancing – applications	T1,R4
	Thurs	18-04-24	3,4	4	Network – CPM/PERT Concept	T1,R4
14	Tues	23-04-24	5	4	Project time estimation – critical path	T2,R4
	Thurs	25-04-24	3,4	4	CPM Concept Problem	T1,R4
15	Tues	30-04-24	5	4	PERT Concept problem	T2,R4
	Thurs	02-04-24	3,4	4	Crashing of network	T1,R4
16	Tues	07-04-24	5	4	Decision tree analysis – Concept	T2,R4
	Thurs	09-04-24	3,4	4	Decision tree analysis – applications	T1,R4

COURSE DELIVERY/INSTRUCTIONAL METHODOLOGIES:

✓ Chalk & Talk	✓ Stud. Assignments	✓ Web Resources
✓ LCD/Smart boards	✓ Stud. Seminars	☐ Add-On Courses

COURSE ASSESSMENT METHODOLOGIES-DIRECT

✓ University (End Semester) Examination		✓ Internal Assessment Tests	
✓ Assignments	☐ Laboratory Practices	☐ Mini/Major Projects	✓ Stud. Seminars
☐ Viva Voce	☐ Certifications	☐ Add-On Courses	☐ Others

COURSE ASSESSMENT METHODS

S.N.	Mode of Assessment	Date	Duration	% Weight
1	Internal Assessment Tests 1		1½ hr	20 %
2	Internal Assessment Tests 2		1½ hr	20 %
3.	University Examination		3 hr	60 %
	Additional marks may be given for Assignments / Group / Team Seminar Presentation)			

COURSE ASSESSMENT METHODOLOGIES-INDIRECT

✓ Assessment of CO (By Feedback, Once)	✓ Student Feedback On Faculty (Once)
☐ Assessment of Mini/Major projects by Ext. Experts	☐ Others

COURSE (EXTRA) ESSENTIAL READINGS:

1. NPTEL LINK
2. Web sources

COURSE EXIT SURVEY (will be collected at end of the course)

The purpose of this survey is to find out from students about their learning experiences and their thoughts about the course.

COURSE OUTCOMES	STUDENTS RATING Low (1) /Medium(2)/ High(3)
CO1:	
CO2:	
CO3:	
CO4:	
CO5:	

PROGRAMME OUTCOMES	STUDENTS RATING Low (1) /Medium(2)/ High(3)
PO1	
PO2	
PO3	
PO4	
PO5	
PO6	
PO7	
PO8	
PO9	
PO10	
PO11	
PO12	
Average	

PROGRAMME SPECIFIC OUTCOMES	STUDENTS RATING Low (1) /Medium(2)/ High(3)
PSO1	
PSO2	
PSO3	

COURSE POLICY (Compensation Assessment)

1. Attending all the assessment is mandatory for every student
2. Course policy will be followed as per the academic course regulation

COURSE ACADEMIC DISHONESTY AND PLAGIARISM

1. All rules and regulation prescribed by the ACOE, University Departments, are applicable in the Internal Assessment Tests and University (End Semester) Examinations. (https://acoe.annauniv.edu/download_forms/student_forms/Guidelines.pdf)
2. In general, possessing a mobile phone, carrying bits of paper with materials, talking to other students, copying from other students during Internal Assessment Tests and University (End Semester) Examinations will be treated as Malpractice and punishable as per the rules and regulations. The misuse of Assignment / Project / Seminar works from others is considered as academic dishonesty and will be treated with the rules and regulations of the University.

COURSE ADDITIONAL INFORMATION

Queries / clarifications / discussion (if required) may be e-mailed to / contact the course instructors during their Office Hours.

For Approval		
K. Nith Commonpur 5/2/24	J. fingleir 02/24	
Course Faculty	Course Coordinator (if any)	HOD (PT)