Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Electrical and Electronics Engineering

BMA701 & OPERATIONS RESEARCH FOR ENGINEERS
Seventh semester (odd Semester)

Course (catalog) description

To enable the students to gain a fair knowledge on characteristics and applications of electrical drives and how to control the speed of the AC & DC Motors.

Compulsory/Elective course **:** Compulsory for EEE students

Credit hours & contact hours : 4 & 60 hours

Course Coordinator : Dr.Ramya

Instructors **:** Dr.Ramya

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Dr.Ramya	Final year, EEE	KS 304	**04422290125**	Hod.maths@gmail.com	9.00 - 9.50 AM

Relationship to other courses:

Pre –requisites **:** BMA502 - Numerical methods

Assumed knowledge : Engineering Maths

Syllabus Contents

UNIT – I LINEAR PROGRAMMING 12

Introduction to phases of Operations Research – Linear programming – formulation of the problem – graphical method – simplex method – two phase method – Assignment problems – Transportation models – Vogel's approximation method – Modi method – unbalanced transportation problem – degeneracy in transportation models.

UNIT – II RESOURCE SCHEDULING AND NETWORKS 12

Resource scheduling – Sequencing n jobs through 2 machines and 3 machines. Networks – PERT and CPM – Network diagrams – shortest route – minimum spanning tree – probability of achieving completion date – crash time – cost analysis – resource smoothing and resource levelling.

UNIT – III INVENTROY AND REPLACEMENT MODELS 12

Inventory models- Types of Inventory and variables in the Inventory problem – deterministic models-Replacement models – Replacement of items that deteriorate with time – equipment that fails completely and their analysis – factors for evaluation of proposals of capital expenditures and comparison and alternatives – present value average investment – rate of return pay off period – individual and group replacement policy.

UNIT – IV QUEUEING MODELS 12

Queuing theory – queuing system and structure – Kendalls's notation– Poisson arrival and exponential service time – characteristic of queuing models – single channel and multiple models – simulation.

UNIT –V DECISION MODELS 12

Game theory –Saddle point-Maximin-Minimax principle-Two person zero sum games (mixed Strategies)Graphical method for 2×n or m×2 games-Dominance Property-Oddment method

Text Books:

1. Kanti Swarup, Gupta, P.K and Manmohan, "Operations Research", Sultan Chand & Sons 1997

References:

1 Handy A. Taha, "Operations Research", 7th Edn. Prentice Hall of India. 2007.
2 Gupta and Hira DS " Operations Research", S. Chand & Co, New Delhi, 2006
3. http://www.nptel.ac.in/syllabus/111107064/

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1st week	Session 1 to 24	2 Periods
2	Cycle Test-2	September 2nd week	Session 25 to 48	2 Periods
3	Model Test	October 2nd week	Session 1 to 60	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

To enable the students to gain a fair knowledge on characteristics and applications of electrical drives and how to control the speed of the AC & DC Motors.	Correlates to program outcome		
	H	**M**	**L**
Apply linear programming model and assignment model to domain specific situations	A	L	
Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results.	J	C,G,I	A,E
Apply the concepts of PERT and CPM for decision making and optimally managing projects	E,H		L
Analyze the various replacement and sequencing models and apply them for arriving at optimal decisions	B,C,H,J		I
Analyze the inventory and queuing theories and apply them in domain specific situations.	E,L	A,I	

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	**LINEAR PROGRAMMING**		
1.	Introduction to phases of Operations Research	Yes	T1,R2,T2
2.	formulation of the problem	Yes	
3.	graphical method – simplex method – two phase method	Yes	
4.	Assignment problems – Transportation models	Yes	
5.	Vogel's approximation method – Modi method	Yes	
6.	unbalanced transportation problem – degeneracy in transportation models.	Yes	
7.	Introduction to phases of Operations Research	Yes	
8.	formulation of the problem	Yes	
9.	Introduction to phases of Operations Research	Yes	
10.	formulation of the problem	Yes	
11.	graphical method – simplex method – two phase method	Yes	
12.	Test	Yes	
13.	Test	Yes	
14.	unbalanced transportation problem – degeneracy in transportation models.	Yes	
15.	Introduction to phases of Operations Research	Yes	
UNIT II	**RESOURCE SCHEDULING AND NETWOR KS**		
16.	Resource scheduling – Sequencing n jobs through 2 machines and 3 machines. Networks	Yes	T2,T1,R1
17.	PERT and CPM – Network diagrams – shortest route	Yes	
18.	minimum spanning tree – probability	Yes	
19.	crash time – cost analysis	Yes	

20.	resource smoothing and resource levelling.	Yes	
21.	Resource scheduling – Sequencing n jobs through 2 machines and 3 machines. Networks	Yes	
22.	PERT and CPM – Network diagrams – shortest route	Yes	
23.	minimum spanning tree – probability	Yes	
UNIT III	**INVENTROY AND REPLACEMENT MODELS**		
24.	Inventory models- Types of Inventory and variables in the Inventory problem		
25.	deterministic models- Replacement models	Yes	
26.	Replacement of items that deteriorate with time – equipment that fails completely and their analysis	Yes	
27.	factors for evaluation of proposals of capital expenditures and comparison and alternatives	Yes	
28.	present value average investment – rate of return pay off period – individual and group replacement policy	Yes	
29.	Inventory models- Types of Inventory and variables in the Inventory problem	Yes	
30.	deterministic models- Replacement models	Yes	
UNIT IV	**QUEUEING MODELS**		
31.	Queuing theory – queuing system and structure – Kendalls's notation	Yes	T3,T1,R2
32.	Poisson arrival and exponential service time	Yes	
33.	Test	Yes	
34.	Test	Yes	
35.	Queuing theory – queuing system and structure – Kendalls's notation	Yes	
36.	Poisson arrival and exponential service time	Yes	
37.	Test	Yes	
38.	Test	Yes	
39.	Queuing theory – queuing system and structure – Kendalls's notation	Yes	
40.	Poisson arrival and exponential service time	Yes	
41.	Test	Yes	
42.	characteristic of queuing models	Yes	

43.	Queuing theory – queuing system and structure – Kendalls's notation	Yes	
44.	Poisson arrival and exponential service time	Yes	
45.	characteristic of queuing models	Yes	
UNIT V DECISION MODELS			
46.	Game theory –Saddle point-Maximin-Minimax	Yes	T1,R1,T2
47.	principle	Yes	
48.	Two person zero sum games	Yes	
49.	Graphical method for 2×n or m×2 games-Dominance Property-Oddment method.	Yes	
50.	Game theory –Saddle point-Maximin-Minimax	Yes	
51.	principle	Yes	
52.	Two person zero sum games	Yes	
53.	Graphical method for 2×n or m×2 games-Dominance Property-Oddment method.	Yes	
54.	Game theory –Saddle point-Maximin-Minimax	Yes	
55.	principle	Yes	
56.	Two person zero sum games	Yes	
57.	Graphical method for 2×n or m×2 games-Dominance Property-Oddment method.	Yes	
58.	Test	Yes	
59.	Test	Yes	
60.	Test	Yes	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	05%
Cycle Test – II	-	05%
Model Test	-	10%
Attendance	-	05%
SEMINAR&ASSIGNMENT	-	05%
Final exam	-	70%

Prepared by: Dr.RAMYA **Dated :**

Addendum

ABET Outcomes expected of graduates of B.Tech / EEE / program by the time that they graduate:

a) An ability to apply knowledge of mathematics, science, and engineering fundamentals.

b) An ability to identify, formulate, and solve engineering problems.

c) An ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

d) An ability to design and conduct experiments, as well as to analyze and interpret data.

e) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

f) An ability to apply reasoning informed by the knowledge of contemporary issues.

g) An ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

h) An ability to understand professional and ethical responsibility and apply them in engineering practices.

i) An ability to function on multidisciplinary teams.

j) An ability to communicate effectively with the engineering community and with society at large.

k) An ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.

l) An ability to recognize the need for, and an ability to engage in life-long learning

Program Educational Objectives

PEO1: PREPARATION

Electrical Engineering Graduates are in position with the knowledge of Basic Sciences in general and Electrical Engineering in particular so as to impart the necessary skill to analyze and synthesize electrical circuits, algorithms and complex apparatus.

PEO2: CORE COMPETENCE

Electrical Engineering Graduates have competence to provide technical knowledge, skill and also to identify, comprehend and solve problems in industry, research and academics related to power, information and electronics hardware.

PEO3: PROFESSIONALISM

Electrical Engineering Graduates are successfully work in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to be able to handle critical situations and meet deadlines.

PEO4: SKILL

Electrical Engineering Graduates have better opportunity to become a future researchers/ scientists with good communication skills so that they may be both good team-members and leaders with innovative ideas for a sustainable development.

PEO5: ETHICS

Electrical Engineering Graduates are framed to improve their technical and intellectual capabilities through life-long learning process with ethical feeling so as to become good teachers, either in a class or to juniors in industry.

Course Teacher	Signature
Dr.RAMYA	

Course Coordinator
(Dr.RAMYA)

HOD/EEE
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