

**Vidya Pratishtan's
Kamalnayan Bajaj Institute of
Engineering and Technology, Baramati.
(An Autonomous Institute)**



Faculty of Science and Technology

Board of Studies

Mechanical Engineering

Syllabus

Open Elective

(Pattern 2023)
(w.e.f. AY: 2024-25)

**Syllabus: Open Electives Mechanical Engineering
(Pattern 2023) w.e.f. AY:2024-2025**

Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
		TH	PR	T U	Acti vity	ISE	ESE	TW	PR	OR	Total	TH	PR	T U	Total
OE2304	Industrial Management	2					50				50	2			2
OE2306	Energy Economics and Management	2					50				50	2			2
OE2307	Operation Research	2					50				50	2			2

Dept. Academic Coordinator
Mr. S. C. Mahadik

Head of Department
Dr. M. S. Lande

Dean Academic
Dr. S. M. Bhosle

Principal
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Head
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Vidyanagari, Baramati-413133

Open Electives (OE) Subjects

OE2301	Digital Marketing	OE2311	Biotechnology
OE2302	Professional Leadership	OE2312	International Relations
OE2303	Organizational Behavior	OE2313	Universal Human Values
OE2304	Industrial Management	OE2314	Education Technology
OE2305	Disaster Management	OE2315	Design Thinking
OE2306	Energy Economic & Management	OE2316	Financial Literacy for Bharat#
OE2307	Operation Research	OE2317	Sustainability & Climate Change
OE2308	Intellectual Property Rights	OE2318	Agriculture Technology
OE2309	Cyber Laws	OE2319	Architectural Technology
OE2310	Bioinformatics		

OE2304:- Industrial Management		
Teaching Scheme:	Credits:02	Examination Scheme:
TH: 02 Hrs/Week	Theory : 02 Tutorial :	Course Activity: - -
		In-Semester Exam: -
End-Semester Exam: 50 Marks		
OR/PR Exam: -		
Term-Work: -		
PR: Hrs/Week		

Prerequisites: Industrial Management offers a unique opportunity of combining and developing comprehensive engineering knowledge with advanced management and leadership skills.

Objectives:

- Engineering disciplines are expected to work during most of their career at middle level. They are also expected to deal with workforce and management problems.
- In the present era of competition, optimum utilization of the resources with achieving higher productivity is essential for any industry to survive. Quality and cost controls are also other important factors which contribute to the day to day supervision issues.

Course Outcomes:

The students will be able to learn:

C01: To interpret and acquire major management skills, familiarize with different leadership styles

C02: To acquire the knowledge of different types of plant layout, Production modes and PPC functions

C03: To understand the need of Total Quality management and appreciate the usage of TQM tools in quality control

C04: To acquire the knowledge of different types of Plant maintenance and measures and procedure observed in industry towards safety

Course Contents

Unit-1:	[07 Hrs.]
<p>Management - Definition – Administration- Definition – Henry-Fayol’s principles of management- Business Organization-Types- Proprietorship-Partnership- Joint stock-Cooperative Society-Advantages and disadvantages -Functions of Management – Organization-Definition- types of organization –Line-Functional-Line & staff-advantages and disadvantages- Leadership -Types –Quality of good leader</p> <p>Motivation - Maslow’s Theory of Motivation -Hierarchy of needs- Communication - Process of Communication – Barriers for effective communication.</p>	
Unit-2: Production Management	[07 Hrs.]
<p>Concept of project work-Project planning-Market survey-Project capacity-selection of site for project plant layout-Types of plant layout.</p> <p>Product design-Stages in product design drawing-specification-Material requirement-operation planning-production definition of Job, Batch and Mass production with their advantages and disadvantages.</p> <p>Productivity-Definition Factors to improve productivity, numerical on partial and total productivity, Production planning and control (PPC) definition, functions of PPC, routing, scheduling, dispatching and inspection.</p>	
Unit-3: Total Quality Management	[08 Hrs.]
<p>Quality-concept, quality control, definition, Factors affecting quality, Advantages of quality control, Inspection and different types of inspection.</p> <p>Total Quality Management-Meaning, principles of total quality management ,PDCA cycle and Quality circle</p> <p>TQM Tools-Flow chart, control chart, histogram, pareto charts, cause and effect diagram,5-S,kaizen ,six sigma and Lean manufacturing.</p>	
Unit-4: Plant Maintenance and Industrial Safety	[08 Hrs.]
<p>Plant maintenance -Definition, types of maintenance, Preventive maintenance, breakdown maintenance advantages and disadvantages.</p> <p>Total productive maintenance-Meaning, benefits of TPM, tools of TPM, planned maintenance and predictive maintenance.</p> <p>Industrial safety-Meaning, accident causes for accident, direct and indirect losses due to an</p>	

accident, and personal protective devices for preventions of accidents.

Safety department-Role of safety officer, safety supervisor, safety committee, fire prevention and protection.

Text Books & Reference Books:

1. Industrial organization and engineering Economics T.R.Banga & S.C.Sharma Khanna Publishers.
2. Industrial management and organizational behavior K.K. Ahuja.
3. Industrial management and engineering economics O.P. Khanna ,Khanna publishers
4. Production and operation management-Dr. K. Aswathappa and Dr. Sreedhar Bhatt Himalaya publishers.
5. Safety management in industry Krishnan N.V. Jaico Publishing House , Bombay 1997.
6. Total Quality Management S Raja Ram , Shivashankar.

OE2306 – Energy Economics and Management		
Teaching Scheme:	Credits:02	Examination Scheme:
TH: 02 Hrs/Week	Theory : 02	Course Activity: -
		In-Semester Exam: -
End-Semester Exam: 50 Marks		
PR / OR Exam: -		
Term-Work: -		
PR: -		

Prerequisites:

Higher Secondary Science courses, Engineering Physics, Engineering Chemistry

Objectives:

1. To gain the ability to identify the demand supply gap of energy in Indian and world scenarios.
2. To understand energy economics.
3. To acquire the systematic knowledge and skill in assessing the energy efficiency, economics, auditing and energy management.

Course Outcomes:

On completion of the course, learner will be able to

CO1. EXPLAIN the energy need and role of energy management

CO2. UNDERSTAND the concepts of energy demand forecasting and its management

CO3. ANALYSE the energy conservation performance for thermal systems

CO4. ANALYSE the energy conservation performance of Electrical Utilities.

Course Contents

Unit-1: Energy Scenario	[06 Hrs.]
Energy needs of a growing economy, Current and long-term energy scenario - India and World, Concept of energy conservation and energy efficiency, Energy and environment, Need of Renewable energy, Principles of Energy management, Energy policy, Energy action Planning, Energy security and reliability, Energy sector reforms.	
Unit-2: Energy Accounting and Analysis	[08 Hrs.]

Costing of Utilities: Determination of the cost of steam, fuels, compressed air, and electricity

Financial Analysis Techniques: Simple payback, Time value of money, Net Present Value (NPV), Return on Investment (ROI), Internal Rate of Return (IRR), Risk and Sensitivity analysis, Energy performance contracts and role of ESCOs.

Unit-3: Energy Management and Conservation in industrial systems

[07 Hrs.]

Importance of energy management, Country Energy Balance, Energy efficiency in thermal utilities like boilers, furnaces, steam systems, compressed air systems, HVAC&R systems, fans and blowers, pumps, cooling tower etc, Cogeneration and waste heat recovery.

Unit-4: Energy Conservation in Electrical systems

[07 Hrs.]

Electricity billing, Electrical load management and maximum demand control, penalties, Power factor improvement and benefits, Selection and location of capacitors. Distribution and transformer losses, Harmonics.

Electrical motors: Types, Efficiency, Selection, Speed control, Energy efficient motors Lamp types and their features, recommended illumination levels, Lighting system performance assessment and efficiency improvement (Numerical), Electricity saving techniques.

Text Books:

1. Energy Management and Conservation Handbook, Frank Kreith and D Yogi Goswami, CRC Press.
2. Bureau of Energy Efficiency Study material for Energy Managers and Auditors Examination: Paper I to IV.
3. Energy Economics: Concepts, Issues, Markets and Governance, S C Bhattacharyya, Springer.

Reference Books:

1. Barney L. Capehart, Wayne C. Turner and William J. Kennedy, "Guide to Energy Management", Seventh Edition, The Fairmont Press Inc., 2012.
2. Craig B. Smith, "Energy Management Principles", Pergamon Press, 2015.
3. Hamies, "Energy Auditing and Conservation; Methods, Measurements, Management and Case Study", Hemisphere Publishers, Washington, 1980.
4. Albert Thumann P.E. CEM, William J. Younger CEM, "Handbook of Energy Audit", The Fairmont Press Inc., 7th Edition.
5. Handbook of Energy Audits by Albert Thumann. CRC press 9th ed.

NPTEL Courses:

1. https://onlinecourses.nptel.ac.in/noc20_hs68/preview
2. https://onlinecourses.swayam2.ac.in/nou23_es05/preview
3. <https://nptel.ac.in/courses/108106022>
4. https://onlinecourses.nptel.ac.in/noc20_mm20/preview
5. https://onlinecourses.nptel.ac.in/noc19_me60/preview

OE2307 – Operation Research		
Teaching Scheme:	Credits:02	Examination Scheme:
TH: 02 Hrs/Week	Theory : 02	Course Activity: -
		In-Semester Exam: -
End-Semester Exam: 50 Marks		
PR / OR Exam: -		
Term-Work: -		
PR: -		

Prerequisites:

Engineering Mathematics, Statistics, Theory of Probability.

Objectives:

1. To familiarize the students with the use of practice oriented mathematical applications for optimization functions in an organization.
2. To familiarize the students with various tools of optimization, probability, statistics and simulation, as applicable in particular scenarios in industry for better management of various resources.

Course Outcomes:

On completion of the course, learner will be able to

C01-FORMULATE various management problems and **SOLVE** them using Linear programming using graphical method and simplex method.

C02 - SELECT appropriate model for sequencing situations and **FIND** the optimal solutions using models for different situations.

C03 - EVALUATE various situations of Games theory and **APPLY** them to solve them in real life for decision making.

C04 - PLAN optimum project schedule for network models arising from a wide range of applications and for replacement situations find the optimal solutions using appropriate models for the situation.

Course Contents

Unit-1: Linear Programming	[07 Hrs.]
Introduction, Formulation of LPP, LPP by Graphical Method, Solution of LPP by Simplex Method.	
Unit-2: Sequencing Models	[07 Hrs.]
Solution of Sequencing Problem - Processing of n Jobs Through Two Machines, Processing of n Jobs Through Three Machines, Processing of Two Jobs Through m Machines, Processing of n Jobs Through m Machines.	
Unit-3: Theory of Games	[08 Hrs.]
Introduction, Classification of Games, Two-person Zero Sum Games, Solution of 2 x 2 Game with no Saddle Point, Dominance in Games, Sub game Method to Solve (2 x n or m x 2) Mixed Strategy Games, Graphical Method to Solve (2 x n or m x 2).	
Unit-4: Project Management	[08 Hrs.]
<p>Network Models: Fulkerson's Rule, Concept and Types of Floats, CPM and PERT, Crashing Analysis and Resource Scheduling</p> <p>Replacement Analysis: Replacement of Items that Deteriorate, Replacement of Items that Fail Suddenly.</p>	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Prem Kumar Gupta, D. S. Hira, Problems in Operations Research: Principles and Solutions, S. Chand, 1991. 2. J. K. Sharma, Operations Research: Theory and Application, Laxmi pub. India, 2010. 3. Operations Research, S. D. Sharma, Kedar Nath Ram Nath-Meerut, 2015. 4. L.C.Jhamb, Quantative Techniques Vol. I &II, Everest Publication, 2007. 5. Manohar Mahajan, Operation Research, Dhanpatrai Publication, 2006. 6. V. K. Kapoor, Operations Research: Quantitative Techniques for Management, Sultan Chand Publications, 2013. 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Hillier F.S., and Lieberman G.J., Operations Research, Eight Edition, Mc. Tata McGraw Hill, India, 2011. 2. Ravindran, –Engineering optimization Methods and Applications , 2nd edition, Wiley, India. 	

3. Ravindran, Phillips and Solberg, Operations Research Principles and Practice, Second Edition, Mc. WSE Willey.

4. Operations Research - An introduction, Hamdy A Taha, Pearson Education, 2010.

NPTEL Courses:

1. <https://nptel.ac.in/courses/110106062>

2. <https://nptel.ac.in/courses/111107128>

3. <https://www.digimat.in/nptel/courses/video/110106062/L01.html>

4. <https://archive.nptel.ac.in/courses/112/106/112106134>



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