



RAAK

COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
An ISO 9001:2015 Certified Institution

1.3.1 List of subjects relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability in transacting the curriculum.



A handwritten signature in green ink, appearing to read "S. Seenuvasamurthi".

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ACADEMIC YEAR (2022-2023)

S.No	Program Code	Program Name	Course Code	Course Name	Integrates with crosscutting issues
1	BTHCS	Computer science & Engineering	T109	Environmental Science	Environment and Sustainability
	BTHIT	Information technology			
	BTHEC	Electronics & Communication Engineering			
	BTHEE	Electrical & Electronics Engineering			
	BTHMC	Mechanical Engineering			
2	BTHMC	Mechanical Engineering	MET72	Industrial Engineering & Management	Professional Ethics
3	BTHMC	Mechanical Engineering	MET73	Refrigeration ,air conditioning & cryogenic Engineering	Environment and Sustainability
4	BTHMC	Mechanical Engineering	MET82	Professional ethics and Indian Constitution	Professional Ethics
5	BTHMC	Mechanical Engineering	MEE61	Automobile Engineering	Environment and Sustainability
6	BTHMC	Mechanical Engineering	MEE71	Energy & Environmental Management	Environment and Sustainability
7	BTHMC	Mechanical Engineering	MEE810	Total quality Management	Professional ethics
8	BTHEE	Electrical & Electronics Engineering	EET82	Professional ethics Practice	Professional ethics



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9	BTHEE	Electrical & Electronics Engineering	EET71	Industrial Management	Professional ethics
10	BTHEE	Electrical & Electronics Engineering	EEE05	Electrical safety and quality management	Professional ethics
11	BTHEE	Electrical & Electronics Engineering	EEE04	Energy Engineering	Environment and Sustainability
12	BTHEE	Electrical & Electronics Engineering	EEE12	Renewable energy sources	Environment and Sustainability
13	BTHEC	Electronics & Communication Engineering	ECT81	Professional ethics	Professional ethics
14	BTHEC	Electronics & Communication Engineering	ECT82	Industrial Management & Engineering economics	Professional ethics
15	BTHCS	Computer science & Engineering	CST81	Professional ethics	Professional ethics
16	BTHCS	Computer science & Engineering	CST82	Engineering economics & Management	Professional ethics
17	BTHIT	Information technology	IT-T81	Professional ethics	Professional ethics




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PONDICHERY UNIVERSITY

B.Tech – CURRICULUM & SYLLABUS

MECHANICAL ENGINEERING

I Semester


S. No.	Subject Code	Subjects	Periods			Credits	Marks		
			L	T	P		IA	UE	TM
Theory									
01	T101	Mathematics – I	3	1	0	04	25	75	100
02	T102	Physics	4	0	0	04	25	75	100
03	T103	Chemistry	4	0	0	04	25	75	100
04	T104	Basic Electrical and Electronics Engineering	3	1	0	04	25	75	100
05	T105	Engineering Thermodynamics	3	1	0	04	25	75	100
06	T106	Computer Programming	3	1	0	04	25	75	100
Practical									
07	P101	Computer Programming Lab	0	0	3	02	50	50	100
08	P102	Engineering Graphics	2	0	3	02	50	50	100
09	P103	Basic Electrical and Electronics Lab	0	0	3	02	50	50	100
Total			22	4	9	30	300	600	900

II Semester

S. No.	Subject Code	Subjects	Periods			Credits	Marks		
			L	T	P		IA	UE	TM
Theory									
01	T107	Mathematics – II	3	1	0	04	25	75	100
02	T108	Material Science	4	0	0	04	25	75	100
03	T109	Environmental Science	4	0	0	04	25	75	100
04	T110	Basic Civil and Mechanical Engineering	4	0	0	04	25	75	100
05	T111	Engineering Mechanics	3	1	0	04	25	75	100
06	T112	Communicative English	4	0	0	04	25	75	100
Practical									
07	P104	Physics Laboratory	0	0	3	02	50	50	100
08	P105	Chemistry Laboratory	0	0	3	02	50	50	100
09	P106	Workshop Practice	0	0	3	02	50	50	100
10	P107	NSS/NCC*	-	-	-	-	-	-	-
Total			22	2	9	30	300	600	900

* To be completed in I & II semesters, under Pass/Fail option only and not counted for CGPA calculation.




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V Semester

S. No.	Subject Code	Subjects	Periods			Credits	Marks		
			L	T	P		IA	UE	TM
Theory									
01	MET51	Dynamics of Machinery	3	1	0	04	25	75	100
02	MET52	Design of Machine Elements	3	1	0	04	25	75	100
03	MET53	Metrology and Quality Control	4	0	0	04	25	75	100
04	MET54	Heat and Mass Transfer	3	1	0	04	25	75	100
05	MET55	Mechanical Measurements	3	1	0	04	25	75	100
06		Elective - I	4	0	0	03	25	75	100
Practical									
07	MEP51	Manufacturing Process Lab - III	0	0	3	02	50	50	100
08	MEP52	Mechanical Measurement and Metrology Lab	0	0	3	02	50	50	100
09	MEP53	Computational Methods Lab	2	0	2	02	50	50	100
10	MEP54	General Proficiency - I	0	0	3	01	100	--	100
Total			20	4	12	30	400	600	1000

VI Semester

S. No.	Subject Code	Subjects	Periods			Credits	Marks		
			L	T	P		IA	UE	TM
Theory									
01	MET61	Operations Research	3	1	0	04	25	75	100
02	MET62	Design of Transmission Systems	3	1	0	04	25	75	100
03	MET63	Thermal Engineering	3	1	0	04	25	75	100
04	MET64	Computer Integrated Manufacturing	4	0	0	04	25	75	100
05	MET65	Control System Engineering	3	1	0	04	25	75	100
06		Elective - II	3	1	0	03	25	75	100
Practical									
07	MEP61	Thermal Engineering Lab - I	0	0	3	02	50	50	100
08	MEP62	Dynamics of Machine Lab	0	0	3	02	50	50	100
09	MEP63	Computational Fluid Dynamics Lab	0	0	3	02	50	50	100
10	MEP64	General Proficiency - II	0	0	3	01	100	--	100
Total			19	5	12	30	400	600	1000




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VII Semester

S. No.	Subject Code	Subjects	Periods			Credits	Marks		
			L	T	P		IA	UE	TM
Theory									
01	MET71	Computer Aided Design	3	1	0	04	25	75	100
02	MET72	Industrial Engineering and Management	4	0	0	04	25	75	100
03	MET73	Refrigeration, Air Conditioning and Cryogenic Engineering	3	1	0	04	25	75	100
04		Elective - III	3	1	0	03	25	75	100
Practical									
05	MEP71	Thermal Engineering Lab - II	0	0	3	02	50	50	100
06	MEP72	Computer Aided Engineering Lab	0	0	3	02	50	50	100
07	MEP73	Comprehensive Viva - Voce	0	0	3	01	50	50	100
08	MEP74	Industrial Visit/Training Report	-	-	-	01	100	-	100
09	MEPW7	Project Work(Phase I)	-	-	3	04	50	50	100
Total			13	3	12	25	400	500	900

VIII Semester

S. No.	Subject Code	Subjects	Periods			Credits	Marks		
			L	T	P		IA	UE	TM
Theory									
01	MET81	Power Plant Engineering	3	1	0	04	25	75	100
02	MET82	Professional Ethics and Indian Constitution	1	0	0	01	100	--	100
03		Elective - IV	3	1	0	03	25	75	100
04		Elective - V	3	1	0	03	25	75	100
Practical									
05	MEPW8	Project Work (Phase II)**	0	0	12	08	50**	50	100
06	MEP81	Seminar	0	0	3	01	100	--	100
Total			10	3	15	20	325	275	600





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LIST OF ELECTIVES

SUBJECT CODE	SUBJECTS
	Elective – I
MEE51	Computational Methods and Programming
MEE52	Direct Energy Conversion Systems
MEE53	Engineering Tribology
MEE54	Industrial Casting Technology
MEE55	Nuclear Power Engineering
	Elective – II
MEE61	Automobile Engineering
MEE62	Computational Fluid Dynamics
MEE63	Finite Element Methods
MEE64	Industrial Automation
MEE65	Mechatronics
MEE66	Nano Technology
MEE67	Theory of Metal Cutting
	Elective – III
MEE71	Energy and Environmental Management
MEE72	Industrial Robotics
MEE73	Integrated Materials Management
MEE74	Metal Forming Processes
MEE75	Product Design and Development
MEE76	Solar Power Engineering
	Elective – IV and V
MEE81	Advanced Welding Techniques
MEE82	Automotive Fuels, Pollution and Control
MEE83	Composite Materials
MEE84	Fluid Power Automation
MEE85	Maintenance and Safety Engineering
MEE86	MEMS and Micro - Nano Fluids
MEE87	Project Management
MEE88	Robust Design
MEE89	System Design and Optimization in Thermal Engineering
MEE810	Total Quality Management




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T109 ENVIRONMENTAL SCIENCE

OBJECTIVES

- To know about the environment.
- To understand about environmental pollution.
- To apply the knowledge in understanding various environmental issues and problems.

UNIT I – ENVIRONMENT AND ENERGY RESOURCES

Environmental segments – atmosphere, hydrosphere, lithosphere and biosphere. Atmospheric layers. Pollution definition and classification. Pollutants classification. Forest resources - use and over exploitation, deforestation, forest management. Water resources - use and conflicts over water, dams-benefits and problems. Mineral resources - mineral wealth of India, environmental effects of extracting and using mineral resources. Food resources - world food problems, environmental impact of modern Agriculture - fertilizer and pesticides. Energy resources-growing needs, renewable and non-renewable energy resources and use of alternate energy sources. From unsustainable to sustainable development.

UNIT II – ECOSYSTEM AND BIODIVERSITY

Concept of an ecosystem - structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of forest, grassland, desert and aquatic (fresh water, estuarine and marine) ecosystem. Biodiversity - definition-genetic species and ecosystem diversity. Value of biodiversity – consumptive use, productive use, social, ethical, aesthetic and option values. Hot spots of biodiversity. Threats to biodiversity ,habitat loss, poaching of wildlife, human wildlife conflicts. Endangered and endemic species. Conservation of biodiversity – In-situ and ex-situ conservation of biodiversity.

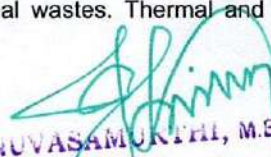
UNIT III - AIR POLLUTION

Definition and classification. Chemical and photochemical reaction in different layers of atmosphere. Causes, sources, effects, and control measures of air pollutants – oxides of Nitrogen, oxides of Carbon, oxides of Sulfur, hydrocarbons, chloro – fluoro carbons and particulates. Mechanism and effects of air pollution phenomenon – Global warming, Ozone Depletion, Acid rain, Sulfurous Smog and Photochemical Smog.

UNIT IV - WATER AND LAND POLLUTION

Water pollution – causes and effects of organic water pollutants – pesticides, insecticides, detergents and surfactants, causes and effects of inorganic water pollutants – heavy metal pollution due to Hg, Pb, Cr, & Cu. Water pollution control and monitoring – DO, COD, BOD & TOC. Land pollution – solid waste management – causes, effect and control measures of urban and industrial wastes. Thermal and radioactive pollution.




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UNIT V – POLLUTION CONTROL AND MONITORING

Basic concepts and instrumentation of IR, UV-VIS, atomic absorption spectrometry, Gas Chromatography and Conductometry. Analysis of air pollutants – NO_x, CO_x, SO_x, H₂S, Hydrocarbons and particulates.

Text Books:

1. K. Raghavan Nambiar, "Text Book of Environmental studies" 2nd Ed, Scitech Publications (India) Pvt Ltd, India, 2010 (For Units I & II)
2. A. K. De, "Environmental Chemistry" 7th Ed; New age International (p) Ltd, New Delhi, 2010.(For Units III,IV&V)

Reference Books:

1. B.K. Sharma, "Environmental chemistry" 11th Ed, KRISHNA Prakashan Media (P) Ltd, Meerut, 2007.
2. S.S. Dara, and D.D. Mishra "A text book of environmental chemistry and pollution control, 5th Ed, S.Chand and Company Ltd, New Delhi, 2012.
3. Richard T. Wright, Environmental Science: Toward a sustainable future, 10th edition, Prentice Hall, 2008.
4. G.S. Sodhi, Fundamental concepts of environmental chemistry, I Ed, Alpha Science International Ltd, India, 2000.




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MET72 INDUSTRIAL ENGINEERING AND MANAGEMENT (4 0 0 4)

OBJECTIVES

- To provide the students knowledge of productivity techniques and systems, industrial engineering and management disciplines so as to fully equip them to take up challenging assignments as industrial engineers, systems managers, productivity advisers, managers of management services or training officers

COURSE OUTCOMES

Upon completion of the course, the students will

- Competently employ broad-based analytical tools and computers for decision-making and system design, analysis and performance
- Assume managerial and leadership roles in their chosen professional careers while working in multidisciplinary teams.
- Engage in continuous learning by seeking out opportunities for higher education or ongoing training related to their employment.
- Effectively adapt to the changing demands in workplace and are able to perform increasingly complex tasks, and tasks outside their field of expertise.

SYLLABUS:

Unit I : Plant Location, Layout and Material Handling

Plant Location : influencing factors - evaluation of location alternatives for Single facility location problems – solving simple problems.

Plant Layout : classification of production systems – principles of layout – basic types of layout – line balancing – simple problems in line balancing using Ranking Positional Weight Method.

Material Handling : functions – principles – classification of material handling equipments (only classification and no description) - factors to be considered in selection of material handling equipment. (9 hours)

Unit II : Work Study

Method Study : objectives - basic procedure - various recording techniques – process charts, multiple activity charts, SIMO chart, Flow diagram, string diagram, cyclegraph and chronocyclegraph - principles of motion economy – Therbligs - micromotion study & memomotion study.

Work Measurement : purpose - basic procedure – various techniques of work measurement – analytical estimation – stop watch time study – time study equipments – different systems of performance rating – time allowances – PMTS - work sampling – simple problems involving the determination of standard time and compensation. (9 hours)

Unit-III : Production Planning and Control

Production Planning and Control : functions – qualitative and quantitative techniques of forecasting – simple problems in forecasting using moving average, weighted moving average, simple exponential smoothing and regression methods - routing – loading and scheduling – different methods of scheduling – expediting – dispatching – functions and objectives of materials management – Introduction to inventory control and ABC analysis. (9 hours)

Unit IV : General and Financial Management

Management : Basic Concepts – Introduction to modern management – Taylor's contribution - Fayol's principles - functions of management.

Financial Management : fixed and working capital - sources of finance - evaluation of investment alternatives using present worth / future worth / annuity / rate of return



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methods – different methods of determining depreciation – Elements of cost & cost ladder - break-even analysis – simple problems. (9 hours)

Unit V : Marketing and Human Resources Management

Marketing Management : Concepts of Marketing - products and markets – pricing - channels of distribution - sales promotion - advertising - basics of market research.

Human Resources Management : individual and group behaviour – Maslow's hierarchy of needs – motivation and morale - fatigue - causes & remedy - manpower planning – job analysis – job evaluation and merit rating - management by objectives (MBO). (9 hours)

TEXT BOOKS :

1. R.Panneerselvam - Production and Operations Management, PHI Learning Pvt. Ltd., 2nd Edition, 2006.
2. Martand Telsang - Industrial Engineering and Production Management, S.Chand & Co., 2nd Revised Edition, 2006.
3. O.P.Khanna - Industrial Engineering and Management, Dhanpat Rai Sons (P) Ltd., 2010.

REFERENCE BOOKS :

1. Joseph Monks - Operations Management: Theory and Problems, McGraw Hill Education, ISE Edition, 1987.
2. R.M.Barnes - Motion and Time Study: design and Measurement of Work, John Wiley & Sons, 7th Edition, 1980.
3. Roger G.Schroeder Susan Meyer Goldstein and M. Johnny Rungtusanatham - Operations Management : Contemporary Concepts and cases, McGraw Hill, New York, 5th Edition, 2011.

E LEARNING RESOURCES :

1. www.nptel.ac.in
2. Mark Lehto and Steven J Landry - Introduction to Human Factors and Ergonomics for Engineers, CRC Press, 2nd Edition, 2013.
3. Suresh P Sethi, Marija Pogatas and Lorenzo Ros-McDonell (Editors) – Industrial Engineering: Innovative Networks, Springer Verlag London Limited, 2012.
4. S.B.Patil, A.A.Karad and P.B.Kushare – Industrial Engineering & Management, Technical Publications Pune, 1st Edition, 2008.
5. Gavriel Salvendy (Ed.) - Handbook of Industrial Engineering: Technology and Operations Management, John Wiley & Sons, 3rd Edition, 2001.
6. Kjell B Zandin - Maynard's Industrial Engineering Handbook, John Wiley & Sons, 5th Edition, 2001.




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**MET73 REFRIGERATION, AIR CONDITIONING AND
CRYOGENIC ENGINEERING (3 1 0 4)**

OBJECTIVES

- To expose to different methods of refrigeration
- To disseminate the operation of various types of refrigeration systems
- To build up an intuitive understanding of operation of air-conditioning systems
- To develop ability to estimate capacity of any air-conditioner
- To understand the basics of cryogenics and operation of cryogenic systems

UNIT - I: REFRIGERATION

Basics of refrigeration – Methods of refrigeration: ice refrigeration, evaporative refrigeration, expansion cooling, throttling – Unit of refrigeration – vapour compression refrigeration system- p-h and T-s diagrams- deviations from theoretical cycle – sub-cooling and super heating- effects of condenser and evaporator pressure on COP- Refrigerants: primary and secondary refrigerants –Properties of refrigerants – Selection of refrigerants- Nomenclature - ODP & GWP (09 hours)

UNIT II OTHER REFRIGERATION SYSTEMS

Vapour absorption refrigeration system- Working pairs of absorption refrigeration system – vapour jet refrigeration system, thermoelectric refrigeration system, Air refrigeration system, vortex tube refrigeration, pulse tube refrigeration and adiabatic demagnetization cooling (09 hours)

UNIT - III: PSYCHROMETRY AND AIR-CONDITIONING

Psychrometry and psychrometric properties – Psychrometric Chart- Psychrometric relations: Dalton's law of partial pressures – Wet bulb temperature and measurement – Adiabatic saturation temperature – Psychrometric processes – Air-conditioning systems: summer air-conditioning and winter air-conditioning – Requirement for comfort air-conditioning – Factors governing human comfort – Comfort chart. (09 hours)

UNIT - IV: COOLING LOAD AND DESIGN OF AIR-CONDITIONING SYSTEMS

Sources of heat load – Conduction load – Sun load – Load from occupants – Equipment load – Infiltration air-load – Load from moisture gain – Fresh air load – ASHRAE standards – Calculation of load on air-conditioning system – Methods of air-conditioning system: Centralized air-conditioning system, unitary air-conditioning system and direct air-conditioning system – Air-conditioning devices and equipment: air cleaners, air filters, humidifiers, dehumidifiers, fans and blowers – cooling towers. (09 hours)

UNIT -V: CRYOGENICS LIQUEFACTION AND REFRIGERATION SYSTEMS

Introduction to cryogenics – Applications involving cryogenic engineering – Cryogenic fluids and properties – Production of low temperature: Joule-Thomson effect – Inversion curve – Adiabatic expansion – Cryogenic liquefaction systems: Linde-Hampson system, pre-cooled Linde-Hampson system, Linde dual pressure system, Claude system, pre-cooled Claude system, Kapitza system, Heylandt system, Collin's helium-liquefaction system and Simon helium-liquefaction system. Joule - Thomson refrigeration system – Cascade Joule -Thomson refrigeration system – Expansion - engine refrigeration system – Cold gas refrigeration system – Philips refrigerator – Solvay refrigerator – A. D. Little refrigerator – Vuilleumier refrigerator. (09 hours)

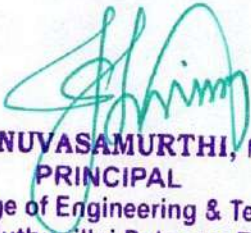



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Reference books:

1. Arora, C. P., Refrigeration and Air conditioning, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2000
2. Stoecker, W. F. and Jones, J. W., Refrigeration and Air conditioning, McGraw Hill Book Publishing Co. Ltd., New York, 1995
3. ASHRAE Equipment Handbook, The American Society of Heating, Refrigerating and Air-conditioning Engineers Inc., Atlanta, Georgia, 2001
4. Randall Barron, Cryogenic Systems, McGraw Hill Book Publishing Co. Ltd., New York, 1966
5. Timmerhaus, K. D. and Flynn, T. M., Cryogenic Process Engineering, Plenum Press, New York, 1989




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3. John Bank - The Essence of Total Quality Management, Prentice Hall of India, 1998.
4. James I Bossert - Quality Function Deployment, ASQC Quality Press, Wisconsin, 1994.
5. Kanishka Bedi – Quality Management, Oxford University Press, 8th Impression, 2011.
6. Poornima M Charantimath – Total Quality Management, First Indian Print, 2003.

E LEARNING RESOURCES :

1. www.nptel.ac.in




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MET82 PROFESSIONAL ETHICS AND INDIAN CONSTITUTION (1 0 0 1)

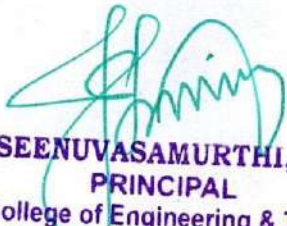
The course should cover the following topics by way of Seminars, Expert Lectures and assignments:

1. Engineering Ethics – Moral issues, Ethical theories and their uses
2. Engineering as Experimentation – Code of Ethics
3. Engineer's responsibility for safety
4. Responsibilities and rights
5. Global issues of engineering ethics
6. Fundamental Rights and Constitution of India

References:

1. Charles D.Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999
2. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
4. World Community Service Centre, " Value Education", Vethathiri publications, Erode, 2011




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ELECTIVE – II

MEE61 AUTOMOBILE ENGINEERING (4 0 0 4)

OBJECTIVES

- To explain the construction features of chassis systems.
- To analyze the various layouts by applying principles of mobility mechanics.
- To analyze the different configurations of IC engines by the principles of engine kinematics.
- To explain the transmission system of automobile
- To explain the Electrical system of automobile

UNIT I

Classification of vehicles – drives - general layout. Engine - Diesel and Petrol engines for automobiles - two stroke and four stroke engines - comparison of performance - factors affecting choice - power requirements of an automobile - rolling, wind and gradient resultant-factors affecting resistance and power requirement. (09 hours)

UNIT – II

Power transmission system - requirement of transmission system – clutches - plate clutches – semi automatic & automatic clutches - Gear box: manual shift four speed and positive speed gear boxes - synchromesh devices -fluid transmission - fluid flywheel and torque converter-automatic transmission - drive line - differential, conventional and non-slip types - drive axle. (09 hours)

UNIT – III

Suspension system – requirements - rigid axle and independent suspension - types of suspension - leaf spring - coil spring - torsion rod and air suspension - shock absorbers. Front axle : types – front wheel geometry - conditions for true rolling. Steering geometry - Ackerman and Davis steering - steering linkages - steering gear box-power and power assisted steering.
Wheel alignment - Tyres: materials and types static and rolling properties of pneumatic tyres. (09 hours)

UNIT – IV

Braking system - hydraulic braking systems - drum type and disc type brakes - power and power assisted brakes - factors affecting brake performance - tests on brakes - skid and skid prevention. Chassis - types of bodies - chassis frame - integral body - vehicle stability. (09 hours)

UNIT – V

Battery: types - Chemical reaction – charging - battery rating - battery life - battery testing. Starting motor: constructional features and operation - series wound motor - drive arrangements: types, Ignition: types - ignition coil - contact breaker – distributor - firing order - spark plug. Generator - constructional features of D.C.generator and Alternator – Rectifier - Generator regulation - Automotive lighting - Electronics in automobile. (09 hours)

Text Books:

1. W.H.Crouse, Automotive Mechanics, Tata McGraw Hill Publishing Co., 1995.
5. V.L.Maleev, Internal Combustion Engines, McGraw Hill, 1987.




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ELECTIVE – III

MEE71 ENERGY AND ENVIRONMENTAL ENGINEERING (4 0 0 4)

OBJECTIVES

- To make the student understand and Learn the technical and management skills required to identify and manage opportunities in the energy sector in the sustainable global environment
- To the tools required to synthesise strategies/ solutions to environmental problems
- To Acquire the knowledge and skills for a technical and managerial career in energy and environmental management sectors
- To Develop a critical understanding of the complex environment and ability to integrate various multi-disciplinary components to reach conclusions in holistic problems of sustainable energy generation and utilisation.

UNIT – I

Energy conversion – global energy scenario – Indian context of energy – environmental aspects of fossil, nuclear, hydro and biomass energy conversion – gaseous emissions – solid waste – liquid waste. (9 hours)

UNIT – II

Energy management – need for energy conservation – energy auditing – role of energy manager – energy audit instruments – first and second law approach towards energy conservation. (9 hours)

UNIT – III

Energy conservation in boilers – procedure for efficiency calculation – energy conservation in industries: pumps, fans, compressed air systems, refrigeration and air conditioning system, DG sets, electrical motors, variable speed motors. (9 hours)

UNIT – IV

Pollutants – types – physical and chemical properties of air pollutants – behavior and fate of air pollutants – air pollutants and global climate – air pollutant effects. Pollution control laws and regulation – national and international – role of environmental monitoring in environmental management systems – continuous emissions monitoring systems. (9 hours)

UNIT – V

Pollution control – review of pollution control methods in thermal power plants – industrial – nuclear – automobiles – disposal/treatment of solid and liquid wastes – alternate fuels. (9 hours)


Text Books:

1. A.W. Culp, Principles of Energy Conversion, McGraw Hill Book Co., 1991.
2. Noel de Nevers, Air Pollution control Engineering, McGraw Hill Book Co., 2000.

Reference Books:

1. C.S. Rao, Environmental Pollution Control Engineering, New Age International Pvt. Ltd., 1995.
2. P.O. Callaghan, Energy Management, McGraw Hill Book Co., 1993.





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Reference Books:

1. Newton Steeds & Garret, The Motor Vehicle.
2. Joseph Heitner, Automotive Mechanics, CBS Publishers & Distributors, 1987.
3. R.B. Gupta, Automobile Engineering, Satya Prakashan, New Delhi, 1997.
4. R.B. Gupta., Auto Design, Satya Prakashan, New Delhi, 1995.




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MEE810 TOTAL QUALITY MANAGEMENT (4 0 0 4)

COURSE OBJECTIVES

To introduce students with the TQM concepts, techniques and various process analysis tools, international standards, and expose students to organizational TQM implementation techniques and continuous quality improvement.

COURSE OUTCOMES

Upon completion of the course, the students will be able to

1. Use seven QC tools for data collection and analysis
2. Audit the quality system and take corrective actions when necessary
3. Advise management for the TQM approach development.
4. Implement the TQM approach in an organization for continuous quality improvement.
5. Assess where an organization stands on quality management with respect to various quality standards

SYLLABUS:

Unit I : Introduction to TQM – Strategies concepts and objectives – Total quality model – TQM as applied to Indian Industries – Quality circle concepts – concepts, objectives and functions of quality circles – Benefits of the organization – Training of quality Circle members – Implementation. (9 hours)

Unit II : Tools and Techniques – The seven management tools - Technique for analyzing a quality process – Statistical process Control (9 hours)

Unit III : Cost of quality – Taguchi's quality loss function – House keeping concepts for industries, tool room, production shop – processing industries. (9 hours)

Unit IV : Quality based product and process Design – Design for reliability – Design for maintainability – Quality Function Deployment (QFD) – QFD and Quality Assurance – QFD Principles, Concepts and applications – case studies. (9 hours)

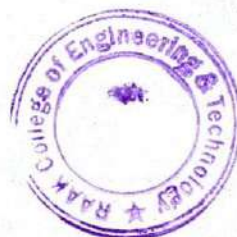
Unit V : Introduction to SQC concepts- KAIZEN Concepts – Kaizen by TQC – POKA YOKE - IS 9000-QS9000,14000 concepts- certification system – 9001 to 9004 systems – procedures, audits and reviews – Lean manufacturing systems- Toyota production concepts-case studies. (9 hours)

TEXT BOOKS :

1. Dale H.Besterfield, et al. - Total Quality Management, Pearson Education Asia, 3rd Edition, 2006.
2. P.N.Mukherjee – Total Quality Management, Prentice Hall of India Ltd., New Delhi, 2006.
3. James R Evans and William M Lindsay – Quality Control and Management, Centage Learning India Pvt. Ltd., New Delhi, 2008.

REFERENCE BOOKS :

1. S.M.Sundara Raja - Total Quality Management, Tata Mc Graw Hill, 1998.
2. Patrick.J.Sweeney(Editor) - TQM for Engineering, Quality Resources, New York, 1993.




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VII SEMESTER

CodeNo.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EE T71	Industrial Management	4	-	-	4	25	75	100
EE T72	Solid State Drives	3	1	-	4	25	75	100
EE T73	Power system operation and control	3	1	-	4	25	75	100
	Elective – III	4	-	-	4	25	75	100
	Elective – IV	4	-	-	4	25	75	100
	Practical							
EE P71	Power System Simulation Lab	-	-	3	2	50	50	100
EE PW7	Project Phase – I	-	-	6	4	100	-	100
EE P72	Seminar	-	-	2	1	100	-	100
EE P73	Training/Industrial Visit	-	-	-	1	100	-	100
	Total	18	2	11	28	475	425	900

VIII SEMESTER

CodeNo.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EE T81	Protection and Switchgear	3	1	-	4	25	75	100
EE T82	Professional Ethical Practice	2	-	-	1	100	-	100
	Elective – V	4	-	-	4	25	75	100
	Elective – VI	4	-	-	4	25	75	100
	Practical							
EE PW8	Project Phase –II	-	-	9	8	50	50	100
EE P81	Comprehensive Viva	-	-	3	1	100	-	100
	Total	13	1	12	22	325	275	600




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LIST OF ELECTIVES

GROUP- A

(To be taken from V and VI semesters)

EE E01	Network Analysis and Synthesis
EE E02	Modern Control Systems
EE E03	Fuzzy and Neural Systems
EE E04	Energy Engineering
EE E05	Electrical Safety
EE E06	Special Electrical Machines
EE E07	Bio-Medical Instrumentation
EE E08	FACTS Controllers

GROUP- B

(To be taken from VII and VIII semesters)

EE E09	Digital System Design using VHDL
EE E10	High Voltage Engineering
EE E11	Power System Economics
EE E12	Renewable Energy sources
EE E13	Digital Control Systems
EE E14	Embedded Systems Design
EE E15	HVDC Transmission
EE E16	Power System Restructuring and Deregulation
EE E17	Optimization Techniques
EE E18	Power System Stability
EE E19	Smart Grid
EE E20	Advanced Insulation Systems




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SYLLABUS

EE T82 PROFESSIONAL ETHICAL PRACTICE

Objective: To teach the moral issues, ethical theories and global issues of engineering ethics for the students.

Outcome: The graduates will be strong and aware of ethical values and they will behave in such a way to make this world as a disciplined society.

The course should cover the following topics by way of Seminars, Expert Lectures and assignments.

Engineering Ethics– Moral issues, Ethical theories and their uses Engineering as Experimentation– Code of Ethics Engineer's responsibility for safety Responsibilities and rights Global issues of engineering ethics

REFERENCEBOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw-Hill, 2003

EE PW8 PROJECT WORK PHASE – II

The objective of the projects is to enable the students to work in convenient group of not more than four members in a group on a project involving analytical, experimental, design combination of these related to one or more areas of Electrical & Electronics Engineering. Each project shall have a guide who is member of faculty of Electrical & Electronics Engineering.


Twelve periods per week is allotted for the phase-II of the project work. Each group of students should complete the project and prepare a report covering literature survey, problem statement methodology, results and conclusions. The guide and departmental committees shall evaluate the student's work for 50 marks based on one seminar and one internal viva-voce. The student shall take up the viva-voce before a committee comprising of an external and an internal examiner, which evaluates the student's work for 100 marks.

EE P81 COMPREHENSIVE VIVA VOICE

A departmental committee for 100 marks for internal assessment evaluates the students on all areas of Electrical & Electronics Engineering. They also shall be examined by a panel of examiners (An internal examiner and an external) on all areas of Electrical & Electronics Engineering at the end of 8th semester.

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SYLLABUS

EE T71 INDUSTRIAL MANAGEMENT

Objective: The course industrial management introduces the core concept of management principles in an industrial environment. The principles of management and types of management like, financial management, production management and materials management will be covered in detail. The key aspects of sales and marketing management like advertising, sales promotion and sales forecasting will be discussed. Introduction to industrial psychology and personal management will help students get to know about the causes and remedies for fatigue, accidents and also the aspects of manpower planning and job analysis.

Outcome: The graduates will be understanding the concepts of engineering economics and they will take key managerial decisions in their place of work. The administrative capabilities of the graduates will be exposed in the industrial environment.

UNIT I

Introduction to Economics- Flow in an Economy, Law of Demand and Supply, Concept of Engineering Economics-Engineering Efficiency, Economic Efficiency, Scope of Engineering Economics, Elements of Costs, Marginal Cost, Marginal Revenue, Sunk Cost, Opportunity cost, Break-Even Analysis, P/V ratio, Elementary Economics Analysis-Structure of Market, Pricing and its related factors.

UNIT II

Make or Buy Decision, Value Engineering- Function, Aims, Value Engineering Procedure, Interest formulas and their applications- Time Value of Money, Single-Payment Compound Factor, Single Payment Present Worth factor, Equal Payment Series Compound Amount Factor, Equal Payment Series Sinking Fund Factor, Equal Payment Series Present Worth Factor, Equal Payment Series Capital Recovery Factor, Uniform Gradient Series Annual Equivalent Factor, Effective Interest Rate, Examples in all the methods.

UNIT III

Methods of Comparison of Alternatives-Present Worth Method of Comparison (Revenue Dominated Cash flow Diagram, Cost Dominated Cash Flow Diagram), Future Worth Method Comparison (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Annual Equivalent Method of Comparison (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Rate of Return Method, Examples in all the methods.

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SYLLABUS

UNIT IV

Principles of management: Basic concepts of management–Scientific management–Henry Fayol’s Principles of management– Types and functions of management. Types of Organisation –characteristics, merits and demerits. Types of industrial ownership– Characteristics, merits and demerits.

UNIT V

Financial management: Sources of finance (Internal and External)-Types of capital-Working capital-Types of investment- Preparation of Trading, Profit and Loss Account and Balance Sheet- Types of Accounting and significance of each types.

Total:60 hours


TEXTBOOKS

1. Panner selvam.R., Engineering Economics, Prentice-Hall Of India Pvt. Ltd, New Delhi, Feb-2013.
2. IM Pandey., Financial Management, Prentice-Hall Of India Pvt.Ltd
3. Management–Oxford University Press

REFERENCEBOOKS

1. Degaramo E.P., Sullivan W.G and Canada J.R., Engineering Economy Macmillan, Newyork.
2. GrantE.L.,Ireson W.Gand Leaven worth R.S.,Principles of Engineering Economy, Ronald Press, Newyork
3. Smith G.W. Engineering Economics, Lowa State Press,Lowa.




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SYLLABUS

EE E05 ELECTRICAL SAFETY AND QUALITY MANAGEMENT

Objective: The objective of the course is to introduce IE rules and its significance, electrical safety in residential, commercial and industrial installations. It also helps the students to know about the electrical safety in during installation, testing and commissioning, operation and maintenance. Besides, it enables the students to know more about the quality management.

Outcome: The graduates will be knowing the electrical safety aspects for the safe working environments and can maintain the quality of the power supply for the industrial requirements.

UNIT I: REVIEW OF IE RULES AND ACTS AND THEIR SIGNIFICANCE

Objective and scope– ground clearances and section clearances– standards on electrical safety– safe limits of current, voltage–earthing of system neutral –Rules regarding first aid and fire fighting facility.

UNIT II: ELECTRICAL SAFETY IN RESIDENTIAL, COMMERCIAL AND AGRICULTURAL INSTALLATIONS

Wiring and fitting–Domestic appliances– water tap giving shock–shock from wet wall–fan Firing shock–multi-storied building–Temporary installations–Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.

UNIT III: SAFETY DURING INSTALLATION, TESTING AND COMMISSIONING, OPERATION AND MAINTENANCE

Preliminary preparations–safe sequence–risk of plant and equipment–safety documentation– field quality and safety - personal protective equipment – safety clearance notice – safety precautions – safe guards for operators– safety.

UNIT IV: ELECTRICAL SAFETY IN HAZARDOUS AREAS

Hazardous zones–class 0,1 and 2– spark, flash overs and corona discharge and functional requirements– Specifications of electrical plants, equipments for hazardous locations– Classification of equipment enclosure for various hazardous gases and vapours– classification of equipment/enclosure for hazardous locations.

UNIT V: QUALITY MANAGEMENT

Total quality control and management–Importance of high load factor– Disadvantages of low power factor –Causes of low P.F.– power factor improvement– equipments– Importance of P.F.

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improvement.

SYLLABUS

Total: 60 Hours

REFERENCES

1. S. Rao, Prof. H.L. Saluja, "Electrical safety, fire safety Engg And safety management", Khanna Publishers. NewDelhi, 1988.
2. Pradeep Chaturvedi, "Energy management policy, planning and utilization", Concept Publishing company, New Delhi, 1997.
3. Nagrath. I.J. and Kothari. D.P. "Power System Engineering", Tata McGrawHill Publishing company Ltd. New Delhi, 1998.




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SYLLABUS

EE E04 ENERGY ENGINEERING

Objective: The objective of the course is to introduce various energy resources right from the conventional energy systems to upcoming renewable energy systems. The course offers details on hydro electric technology, wind, solar and biomass energy technologies. Besides, It enables the students to understand the necessity of energy conservation and management.

Outcome: The graduates will be knowing all the conventional and renewable energy resources and their design and analysis for solving the energy crisis of modern world.

UNIT I : ENERGY RESOURCES

Perspective of energy resources- Forms of Energy- World's energy status- Energy reserves of India- India's Power Scenario- Renewable Energy Sources- Energy parameters- Energy Intensity- Gross Domestic product.

UNIT II: CONVENTIONAL ENERGY SOURCES

Coal fired steam thermal power plant- layout, working principle- Gas turbine power plant- various options, layout, working principle- Nuclear power plants: fuels, nuclear fuel cycle, reactors, nuclear power plant, and nuclear waste management.

UNIT III : HYDRO AND OCEAN ENERGY ELECTRIC TECHNOLOGIES

Hydro Electric plants – Types, energy conversion schemes, power equation, environmental aspects- Hydro-Thermal co ordination-Ocean Energy Technology- Power plant-limitations.

UNIT IV: WIND, SOLAR ENERGY AND DG TECHNOLOGIES

Wind turbine types and construction- wind energy conversion systems- grid connection- environmental aspects. Solar energy basics- Solar PV plant- Distributed Generation- Impacts- Benefits.

UNIT V: ENERGY CONSERVATION AND MANAGEMENT

Principle of energy conservation- waste heat recovery –Heat Exchanger- Economics of energy Conservation-co generation- Definition and Objectives of Energy Management, Energy Management System, Top management support, Energy policy purpose, Roles and responsibilities of energy manager.

Total : 60 hours

TEXT BOOKS

1. S.Rao and Dr.B.B.parulekar, "Energy Technology", Khanna pub.,Third edition, 1999.
2. Non-conventional energy resources by B.H.Khan,TMH, 2006.

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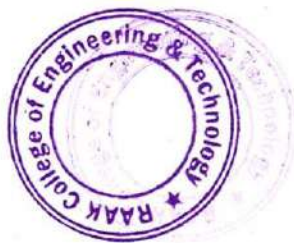
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SYLLABUS

3. Desai,AV,“EnergyDemand:Analysis,ManagementandConservation”,Wiley Eastern Limited, 1990.
4. D.P.Kothari, K.C.Singal, RakeshRanjan.“Renewable Energy Sources and Emerging Technologies”, PHI, 2011.

REFERENCE BOOKS

1. G.D.Rai, “Non-conventional energy sources”, Khanna pub. Fourth Edition, 2002.
2. Pulfrey,D.L., Photo voltaic Power Generation, Van Nostr and Co., 1983.
3. Abbasik“Renewable Energy Sources and their Environment”, PHI, 2008.
4. B.Mohanty, R.S.Liu, U.V Krishna Mohan Rao, “Energy Audit Management for the Indian Industry”, Directorate the Institute of Chartered Accountants of India,NewDelhi, 2001.
5. Encyclopedia of Energy– McGrawHill Publication.
6. Energy Management Handbook, JohnWiley&Sons, Wayne C.Turner.




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SYLLABUS

EE E12 RENEWABLE ENERGY SOURCES

Objective: In this course the students will learn about the concept of various renewable energy sources and instigate knowledge on the production strategies of renewable energy sources.

Outcome: The students will be able to formulate, design and analyse any distribution generation system using renewable energy resources like solar, wind, biogas and geothermal power generation.

UNIT I: GENERAL

Conventional and non-conventional sources of energy- Energy reserves in India. Limitations of Conventional sources of energy-Energy efficiency-Energy conservation-Dispersed Generation.

UNIT II: SOLAR ENERGY AND APPLICATIONS

Solar radiation-Principles of solar energy collection-Types of collector-Characteristics and Principles of different types of collectors and their efficiencies, Solar Energy applications-water heaters, air heaters, solar cooling; solar drying and power generation -solar tower concept (solar plant) -solar pump,

UNIT III: WIND ENERGY

Energy from the wind-General theory of wind mills- Types of wind mills-performance of wind machines-wind power-efficiency. Merits and Limitations of Wind energy system-Modes of wind power generation.

UNIT IV: OCEAN&TIDAL ENERGY

Ocean and Tidal energy conversion-working principle of OTEC-Anderson closed cycle OTEC System - Application of Merits and demerits of ocean energy technologies. Tides- spring tide, neap tide, daily and monthly variation, Tidal range, Tidal Power-Types of tidal power plants, single basin& double basins schemes, main requirements in tidal power plants, energy storage, prospects of tidal power.

UNIT V: BIO-ENERGY

Energy from Bio-mass-Biogas plants various types- Industrial wastes-Municipal waste- Burning plants -Energy from the Agricultural wastes Applications.


Total : 60 hours

TEXT BOOK:

1. D .P .Kothari, K .C .Singal, Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies, PHI, 2011.

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SYLLABUS

REFERENCES

1. S.A.Abbasi and N.Abbasi, Renewable Energy Sources and Their Environmental Impact, PHI, 2001.
2. S.P. Sukhatme, solar. Energy; (Principles of thermal collection and storage), Tata Mc GrawHill Publishers, Fourth Print-February 1989.
3. G.D. Rai, Solar Energy Utilization, Khanna Publishers .Second revised edition, 1984.




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VII Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EC T71	Microwave and Optical Engineering	3	1	-	4	25	75	100
EC T72	Embedded Systems	4	-	-	4	25	75	100
	Elective-III	4	-	-	4	25	75	100
	Elective-IV	4	-	-	4	25	75	100
	Practical							
EC P71	Communication Laboratory- III	-	-	3	2	50	50	100
EC P72	Embedded Systems Laboratory	-	-	3	2	50	50	100
EC P73	Seminar	-	-	3	1	100	-	100
EC P74	Industrial Visit/Training	-	-	-	1	100	-	100
EC PW7	Project Work-I	-	-	6	4	100	-	100
	Total	15	1	15	26	500	400	900

VIII Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EC T81	Professional Ethics	3	-	-	1	100	-	100
ECT82	Industrial Management and Engineering Economics	4	-	-	4	25	75	100
	Elective-V	4	-	-	4	25	75	100
	Elective-VI	4	-	-	4	25	75	100
	Practical							
EC P81	Advanced Communication Laboratory	-	-	3	2	50	50	100
EC P82	Comprehensive Viva	-	-	3	1	50	50	100
EC PW8	Project Work-II	-	-	9	8	50	50	100
	Total	15	-	15	24	325	375	700



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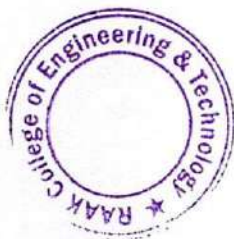
EC T81 - PROFESSIONAL ETHICS


The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:

1. Engineering Ethics – Moral issues, Ethical theories and their uses
2. Engineering as Experimentation – Code of Ethics
3. Engineer's responsibility for safety
4. Responsibilities and rights
5. Global issues of engineering ethics

Reference Book:

1. Charles D.Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999




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EC T82 –INDUSTRIAL MANAGEMENT AND ENGINEERING ECONOMICS

COURSE OBJECTIVE

- *To explore the knowledge about Industrial Economics and their applications.*
- *To analyze the Interest formulae, their applications and the methods of comparison.*
- *To understand the concepts of Depreciation, General Management and Financial Management.*

COURSE OUTCOME

On successful completion of the module students will be able to:

- *Apply fundamental knowledge to understand Industrial Economics and its impact on engineering.*
- *Investigate and solve engineering problems like Interest formulae and understand their applications.*
- *Apply formulae and solve problems of Depreciation, General Management and Financial Management.*

UNIT - I

Introduction to Economics:– Flow in an Economy, Law of supply and Demand, Concept of Engineering Economics – Engineering Efficiency, Economic Efficiency, Scope of Engineering Economics, Elements of costs, Marginal Cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-Even Analysis, P/V ratio, Elementary Economics Analysis-Function, Aims, Value Engineering procedure, Interest Formulas and their Applications – Time Value of Money, Single Payment Compound Amount Factor, Single Payment Present Worth Factor, Equal Payment Series, Compound Amount Factor, Equal Payment Series Sinking Fund Factor, Equal Payment Series Present Worth Factor, Equal Payment Series Capital Recovery Factor, Uniform Gradient Series Annual Equivalent Factor, Effective Interest Rate, Examples in all the methods. (12)

UNIT - II

Methods of Comparison of Alternatives: Present Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Future Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Annual Equivalent Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Rate of Return Method, Examples in all the methods. (12)



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[Signature]
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UNIT - III

Depreciation: Introduction, Straight Line Method of Depreciation, Declining Balance Method of Depreciation, Sum-of-the-Years-Digits Method of Depreciation, Sinking Fund Method of Depreciation/Annuity Method of Depreciation, Service Output Method of Depreciation, Evaluation of Public Alternatives- Introduction, Examples, Inflation Adjusted Decisions – Procedure to Adjust Inflation, Examples on comparison of alternatives and Determination of Economics Life of asset. (12)

UNIT - IV

General Management: Basic concepts of management – Scientific management – Henry Fayal’s principles of management – Types and functions of management. Types of organization – characteristics, merits and demerits. Types of industrial ownership – characteristics, merits and demerits. (12)

UNIT-V

Financial Management: Fixed and variable costs – cost ladder – Break even analysis (simple problems) – Types of capital – working capital – Sources of finance (internal and external) - Evaluation of investments – Present Worth Method, Future Worth Method, Annuity Method and Rate of return Methods (simple problems) – Preparation of balance sheet and profit and loss statements. (12)


Text Books:

1. O.P. Khanna, “Industrial Engineering and Management”, DhanpatRai& sons,1999.
2. R.PannerSelvam, “Production and Operations Management”, PHI Learning, 2002.

Reference Books:

1. MartandTelsang – Industrial Engineering and Production Management, S.Chand andCo., 1998.
2. Shailendra Kale– Production and Operations Management, McGraw Hill, India 2013.




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VII Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
CS T71	Artificial Intelligence	3	1	-	4	25	75	100
CS T72	Computer Hardware and Network Trouble Shooting	3	1	-	4	25	75	100
CS T73	Platform Technology	3	1	-	4	25	75	100
	Elective-III	3	1	-	4	25	75	100
	Practical							
CS P71	Artificial Intelligence Laboratory	-	-	3	2	50	50	100
CS P72	Troubleshooting Laboratory	-	-	3	2	50	50	100
CS P73	Platform Technology Laboratory	-	-	3	2	100	-	100
CS PW7	Project Work – Phase I	-	-	6	6	200	-	200
	Total	12	4	15	28	500	400	900

VIII Semester

Code No.	Name of the SubjCSts	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
CS T81	Professional Ethics	-	-	3	1	100	-	100
CS T82	Engineering Economics and Management	3	1	-	4	25	75	100
CS T83	Information Security	3	1	-	4	25	75	100
	Elective - IV	3	1	-	4	25	75	100
	Elective-V	3	1	-	4	25	75	100
	Practical							
CS P81	Seminar	-	-	3	1	100	-	100
CS P82	Comprehensive Viva-Voce	-	-	3	1	100	-	100
CS PW8	Projects Work – Phase II	-	-	6	8	300	300	600
	Total	12	4	15	27	700	600	1300



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VIII SEMESTER

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T81	PROFESSIONAL ETHICS	-	-	3
<p>UNIT – I Indian Constitution : Structure – Preamble - Fundamental Rights – Directive Principles of State policies - Fundamental Duties – overview of articles & Schedules.</p> <p>UNIT – II Ethics - Ethical Behaviour : Moral Sensitivity – Moral Judgement – Moral Motivation – Moral Courage. Ethical Decision Making – Check points – Steps – Moral Compass</p> <p>UNIT – III Professional Ethics as applied to Engineering – Characteristics of Professional and Professional Ethics – Engineering Ethics. Professional Code of Ethics – IEI & NSPE.</p> <p>UNIT – IV Engineering Ethics : Honesty – Responsibility to Employer – Rights of Engineers – Responsibility towards public – Risk and Liability</p> <p>UNIT – V Responsibility towards Environment. International Engineering Professionalism</p> <p style="text-align: right;">TOTAL PERIODS: 60</p>				
<p>Text Books:</p> <ol style="list-style-type: none"> Charles E Harris Jr, Michael S Pritchard, Michael J Rabins, Engineering Ethics Concepts and Cases, Cengage Learning 2012. 				
<p>Reference Books:</p> <ol style="list-style-type: none"> Mike W.Martin, Roland Schinzinger, Ethics in Engineering, Tata MaGraw Hill Education (P) Ltd., 2012 				




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VIII SEMESTER

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T82	ENGINEERING ECONOMICS AND MANAGEMENT	3	1	-
UNIT – I				
<p>Micro and Macro Economics and Its applications: Nature and Scope of Economics Science; Micro economics, Macro economics; Concept of Equilibrium; Economic efficiency, Technical efficiency; Demand and Supply concepts, Elasticity of Demand and supply; Determinants of Demand; Fixed cost, variable cost, Average cost, marginal cost, opportunity cost; standard cost; concept of iso-quant; Price of products, Break Even Analysis, Nature and Functions of Money, National Income, GNP and Savings, Inflation and Deflation, Business Cycles. Types and principles of management, Elements of management; planning, organising, staffing, co-ordinating etc, types of (ownership) of a firm.</p>				
UNIT – II				
<p>Production Management & Marketing Management:Types of Production; process of planning, scheduling, Routing, material control; product concept concepts of productivity, Core concepts of Marketing- Needs, Wants, Demand- arketng Vs Selling- Products and Markets- Pricing and its related factors- Channels of Distribution- Promotion- Advertising- Market Research- Sales Forecasting.</p>				
UNIT – III				
<p>Financial Management: Sources of finance, internal and external-preparation of balance sheet and profit and loss statements, Types of accounting and significance of each type, interest formulas and their applications.</p>				
UNIT – IV				
<p>Methods of Depreciation: Straight line method of Depreciation- Declining Balance Method of Depreciation-Sum of the Years Digits Method of Depreciation-Sinking Fund Method of Depreciation- Service-output Method of Depreciation.</p>				
UNIT – V				
<p>Methods of Comparison of Alternatives : Present worth method (Revenue and Cost Dominated Cash flow Diagram), Future Worth method (Revenue and Cost Dominated Cash Flow Diagram), Annual Equivalent Method (Revenue and Cost Dominated Cash Flow Diagram) Rate of Return Method (Revenue and Cost Dominated Cash flow Diagram) Examples in all methods.</p>				
TOTAL PERIODS: 60				




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Text Books:

1. O.P. Khanna, 'Industrial Engineering and Management', Dhanpat Rai and Sons, 1989.
2. R. Pannerselvam, 'Engineering Economics', Prentice Hall of India Pvt. Ltd, 2001.

Reference Books:

1. Mote Paul, Gupta, "Managerial Economics" Tata Mc Graw Hill, 1987.
2. Joseph Massie L "Essentials of Management" 3rd Edition PHI 1995.
3. Paul A Samuelson "Economics" Tata Mc Graw Hill 1987.




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SEVENTH SEMESTER

CODE NO.	NAME OF THE SUBJECTS	PERIODS			CREDITS	MARKS		
		L	T	P		IA	UE	TM
IT-T71	MOBILE COMPUTING	3	1	-	4	25	75	100
IT-T72	WEB SERVICES AND XML	3	1	-	4	25	75	100
IT-T73	CRYPTOGRAPHY AND NETWORK SECURITY	3	1	-	4	25	75	100
IT-E7X	ELECTIVE-IV	3	1	-	4	25	75	100
IT-E7X	ELECTIVE-V	3	1	-	4	25	75	100
IT-P71	MOBILE COMPUTING LAB	-	-	3	2	50	50	100
IT-P72	WEB SERVICES AND XML LAB	-	-	3	2	50	50	100
IT-P73	PROJECTWORK PHASE-I	-	-	3	4	100	-	100
IT-P74	SEMINAR	-	-	3	1	100	-	100
IT-P75	INDUSTRIAL TRAINING / INTERNSHIP	-	-	3	1	100	-	100
	TOTAL	15	05	15	30	525	475	1000

EIGHTH SEMESTER

CODE NO.	NAME OF THE SUBJECTS	PERIODS			CREDITS	MARKS		
		L	T	P		IA	UE	TM
IT-T81	PROFESSIONAL ETHICS	3	-	-	1	100	-	100
IT-T82	DISTRIBUTED COMPUTING	3	1	-	4	25	75	100
IT-E8X	ELECTIVE-VI	3	1	-	4	25	75	100
IT-P81	PROJECTWORK PHASE-II	-	-	3	8	50	50	100
IT-P82	COMPREHENSIVE VIVA VOCE	-	-	3	1	50	50	100
	TOTAL	15	05	06	18	250	250	500





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IT-T81 PROFESSIONAL ETHICS


Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
IT-T81	Professional Ethics	3	0	0
Course Objectives:				
<ol style="list-style-type: none"> 1. To introduce the basics of Moral Ethics, Engineering Ethics. 2. To introduce the professional Ethics and Case Studies 				
Course Outcomes:				
On successful completion of this course students will be able to:				
<ol style="list-style-type: none"> 1. Understand the Values of Moral, Engineering and Professional Ethics 				
The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:				
<ol style="list-style-type: none"> 1. Engineering Ethics – Moral issues, Ethical theories and their uses 2. Engineering as Experimentation – Code of Ethics 3. Engineer's responsibility for safety 4. Responsibilities and rights 5. Global issues of engineering ethics 				
Content beyond Syllabus:				
Case studies on Moral, Engineering and Professional Ethics				
Text Books:				
1. Charles D.Fleddermann, Engineering Ethics, Prentice Hall, New Mexico, 1999.				
Reference Books:				
1. Mike W. Martin, Roland Schinzinger, Ethics in Engineering, Tata McGraw Hill, New Delhi, 2005.				




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RAAK COLLEGE OF ENGINEERING & TECHNOLOGY, PUDUCHERRY
LESSON PLAN

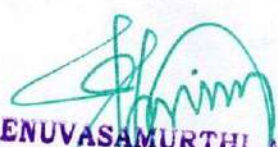
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	Sub Code : MEE71 Sub Name : ENERGY AND ENVIRONMENTAL ENGINEERING Branch : MECHANICAL ENGINEERING Unit : I Semester: VII Title : ENERGY CONVERSION TECHNOLOGIES (100% Theory)	LP Ver No: 01 Date : 21.09.22 Page: 01 of 06
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Objective: To make the student understand and learn the technical and management skills required to identify and manage opportunities in the energy sector in the sustainable global environment.


Session No	Topics to be covered	Period		Ref	Page No	Teaching Method
		L	T			
1,2	Energy conversion: Introduction, global energy scenario Indian context of energy Global Energy scenario	2		R1	7-12	GB
3,4	Biomass energy conversion technologies: Thermo chemical conversion, Bio chemical conversion, Wet process, Dry process	2		R1	13-15	GB
5,6,7	Gaseous emissions: Carbon monoxide (co), Hydrocarbons, Particulate matter	2	1	R1	15-18	GB, PPT
8,9	Liquid waste: Types of water pollutant and their effects, Solid waste and list its classification	2		R2	51-54, 94-97	GB
10,11	Hydro power and its environmental aspects: Electricity from Hydropower, Environmental Impacts, Air Emissions	2		R2	107-110, 111-118	GB, PPT
12,13	Environmental aspects of fossil fuels: Nuclear waste and its environmental aspects, Radioactive Waste Management	2		R1	22-28	GB
Evaluation: IA 1 & Model Exam		Total lecture hours :		13		




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	Sub Code : MEE71	LP Ver No: 01 Date: 20.10.22 Page: 01 of 06
	Sub Name : ENERGY AND ENVIRONMENTAL ENGINEERING Branch : MECHANICAL ENGINEERING Unit : II Semester: VII Title : ENERGY MANAGERMENTS (100% Theory)	

Objective: To teach the students to the tools required to synthesise strategies/ solutions to environmental problems.

Session No	Topics to be covered	Period		Ref	Page No	Teaching Meth
		L	T			
14	Energy Management: introduction, its objectives, Role of energy manager	1		R1	29-31	GB
15,16	Energy Audit with its need and scope: Need of energy audit, Need of cost accounting, Scope of Energy audit	2		R1	32-33	GB, PPT
17,18	Types of Energy Audit: Categories, Functions, Process, Utilities	2		R1	33-35	GB, PPT
19,20,21	Energy Auditing instruments: Electrical parameters (For both AC and DC), Water Flow Meter	2	1	R1	36-37	GB
22,23,24	Thermodynamics laws: First law of Thermodynamics, Second law of Thermodynamics	2	1	R1	38-42	GB
Evaluation : IA I and Model Exam		Total lecture hours		11		




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Sub Code : MEE71

Sub Name : ENERGY AND ENVIRONMENTAL ENGINEERING

Branch : MECHANICAL ENGINEERING

Unit : III

Semester: VII

Title : ENERGY CONSERVATION IN INDUSTRY
(100% Theory)

LP Ver No: 01

Date: : 23.11.22

Page: 03 of 06

Objective: To teach the students about to acquire the knowledge and skills for a technical and managerial career in energy and environmental management sectors.


Session No	Topics to be covered	Period		Ref	Page No	Teaching Method
		L	T			
25,26	Energy conservation in boilers: Procedure for boiler efficiency calculation, Principles of energy conservation	1	1	R1	43-53	GB
27,28	Energy Conservation Act and List its Features: Mandatory provisional act, Important features of Energy Conservation Act, Energy conservation building codes, Promotional Provisions to support EC Act	2		R1	54-57	GB, PPT
29,30,31	Energy Conservation in Industry: Lighting, Energy Conservation for Motors, Other Tips for Energy Conservation in Industrial Sector	2	1	R1	58-64	GB, PPT
32	Energy conservation in Iron and Steel Industry: Rationalization of Combustion, Prevention of Heat loss by Radiation and Transmission, Waste heat recovery	1		R2	65-67	GB
33,34	Energy conservation: Petroleum and Oil Refinery industry, Fertilizers and Chemicals Industry, Cement Industry, Air-Conditioning unit, Electrical Drives	2		R1	67-72	GB
35	Applications: Variable Speed Drive, Variable Speed Drive, Energy conservation opportunities in pumps	1		R1	72-74	GB, PPT
Evaluation : IA -II and Model Exam		Total lecture hours		11		



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	Sub Code : MEE71	LP Ver No: 01
	Sub Name : ENERGY AND ENVIRONMENTAL ENGINEERING	
	Branch : MECHANICAL ENGINEERING	Page: 04 of 06
	Unit : IV	
	Semester: VII	
	Title : COUSES AND EFFECTS OF POLLUTION	
	(100% Theory)	

Objective: To develop a critical understanding of the complex environment and ability to integrate various multi-disciplinary components.

Session No	Topics to be covered	Period			Page No	Teaching Method
		L	T	Ref		
36,37	Pollution: introductions, Air pollution and scales of concentration, Classification and Properties of Air Pollution	1	1	R2	351-356	GB
38,39	Behavior and Fate of Air Pollutants: Wet precipitations, Dry Deposition, Interaction at the earth's surface, Chemical Reactions in the Atmosphere	2		R2	361-366	GB, PPT
40	Effects of Air Pollution: Human Health, Respiratory Effects	1		R1	92	GB, PPT
41,42	Causes air pollution: Particulate matter and materials, Effects of Air pollution on environment, Water pollution laws and standards	2		R1	89-91	GB
43,44, 45	Various laws of air pollutions: International air pollution laws and regulations, International air pollution control	2	1	R1	93-97	GB, PPT
46,47	Philosophy's: Emission Standard Philosophy, Air quality standard philosophy, Emission tax philosophy, Cost benefit philosophy	2		R1	98-102	GB, PPT
Evaluation : IA -II and Model Exam		Total lecture hours		12		




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Sub Code : MEE71 Sub Name : ENERGY AND ENVIRONMENTAL ENGINEERING Branch : MECHANICAL ENGINEERING Unit : V Semester: VII Title : POLLUTION CONTROL (100% Theory)	LP Ver No: 01 Date.: 23.12.22 Page: 05 of 06
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Objective: To teach the students reach conclusions in holistic problems of sustainable energy generation and utilisation.

Session No	Topics to be covered	Period		Ref	Page No	Teaching Method
		L	T			
48,49	Pollution control: introduction, pollution control methods, Treatment of liquid wastes	1	1	R2	51-54	GB, PPT
50,51	waste water treatments: Primary treatment of waste water, Sedimentation in waste water treatment	2		R1	102-109	GB, PPT
52,53	Flocculants settling: Flotation, Biological Treatment, Removal of SO2 from waste gases	2		R2	135-140, 142-146	GB, PPT
54,55 56	Disposal of Solid Waste: Open Dumping, Sanitary Landfill, Incineration, Composting	2	1	R1	118-123	GB
57,58	Alternate fuels: Control of nitrogen oxide emissions, NOX and its concentration	2		R1	124-128	GB, PPT
Evaluation : Model Exam		Total lecture hours		11		

GB – Green Board

PPT – Power Point Presentation

IM-Innovative Method




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Course Delivery Plan:

Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		I		II		III		IV			V				
Units	←		←		IA1	←		←		IA2	←		REV. CLASS + MODEL EXAM		

Content beyond the Syllabus:

1. Energy conservations, gaseous emissions, solid and liquid waste.
2. Energy managements, energy auditing, energy conservations laws, energy conservations in industries, efficiency calculations.
3. Pollutions, types, causes and effects of pollutions, pollutions controls, pollutions controls laws, role of environmental monitoring in environmental management systems.

References:

Text books:

1. A.W. Culp, Principles of Energy Conversion, McGraw Hill Book Co., 1991.
2. Noel de Nevers, Air Pollution control Engineering, McGraw Hill Book Co., 2000.

Reference books:

1. C.S. Rao, Environmental Pollution Control Engineering, New Age International Pvt. Ltd., 1995.
2. P.O. Callaghan, Energy Management, McGraw Hill Book Co., 1993.

Websites / Web courses:

- <https://www.poweredbythenature.com/what-is-biomass-energy/>.
- <https://www.google.co.in/search?q=Indian+context+of+energy&aq=chrome..69i57.1291j0j7&sourceid=chrome&ie=UTF-8#q=need+for+energy+conservation+>.
- <http://www.marineinsight.com/tech/boiler/energy-conservation-in-boilers-and-making-an-audit-report/>.
- <https://www.google.co.in/search?q=Indian+context+of+energy&aq=chrome..69i57.1291j0j7&sourceid=chrome&ie=UTF-8#q=role+of+environmental+monitoring+in+environmental+management+systems+pdf>.
- <https://www.google.co.in/search?q=Indian+context+of+energy&aq=chrome..69i57.1291j0j7&sourceid=chrome&ie=UTF-8#q=pollution+control+methods+in+thermal+power+plants>
- <https://www.google.co.in/search?q=Indian+context+of+energy&aq=chrome..69i57.1291j0j7&sourceid=chrome&ie=UTF-8#q=pollution+control+methods+in+thermal+power+plants>.

Videos:

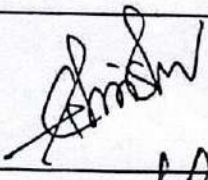
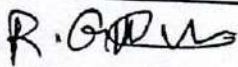
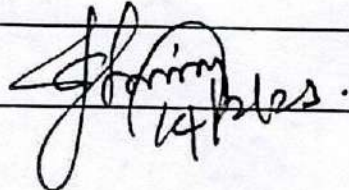
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- https://www.youtube.com/results?search_query=energy+conservation+in+industries.
- https://www.youtube.com/results?search_query=Pollution+control+laws+and+regulation+.
- https://www.youtube.com/results?search_query=disposal%2Ftreatment+of+solid+and+liquid+wastes.




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	Faculty incharge	Approved by	Signature
Name	Mr.R.GOKULAKRISHNAN	HoD	
Designation	ASST.PROFESSOR		
Signature		PRINCIPAL	




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Format No.3b

	Sub Code : ME T73	LP Ver No: 01 Date: 06.09.2022 Page: 01 of 06
	Sub Name : Refrigeration ,Airconditioning and Cryogenics Engg Branch : MECHANICAL ENGINEERING Unit : I Semester: VII Title : Basics Refrigeration System. (75% Theory and 25% problems)	

Objective: To study the basics concepts of refrigeration:

Session No	Topics to be covered	Period		Ref	Page No	Teaching Method
		L	T			
1,2	Basics of refrigeration : Introduction and ;Law of Refrigeration	1	1	R3	77	PPT
3,4,5	Methods of refrigeration: Ice Refrigeration, air Refrigeration, Vapour compression Refrigeration, Absorption Refrigeration system	2	1	R3	78	GB,PPT
6,7	Vapour compression Refrigeration: P-H ans T-S diagram – derivation from theortical cycle	2		R3	125	GB
8	sub-cooling and super heating	1		NET		IM,PPT
9	condenser and evaporator: Effect , pressure on COP	1		R3	385,376	GB
10	Refrigerants: primary and secondary refrigerants –Properties of refrigerants	1		R3	294	GB
11	ODP , GWP : Definition	1		NET		PPT
Evaluation: IA 1 & Model Exam		Total lecture hours :		11		





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Format No.3b

	<p>Sub Code : ME T73</p> <p>Sub Name : Refrigeration ,Airconditioning and Cryogenics Engg</p> <p>Branch : MECHANICAL ENGINEERING</p> <p>Unit : II Semester: VII</p> <p>Title : Other Refrigeration System. (75% Theory and 25% problems)</p>	<p>LP Ver No: 01</p> <p>Date:06.09.2022</p> <p>Page: 02 of 06</p>
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Objective: To teach the students about the other types of refrigeration system.


Session No	Topics to be covered	Period		Ref	Page No	Teaching Method
		L	T			
12,13	Vapour absorption refrigeration system- working advantage and disadvantage.	2		R3	273	GB
14,15,16	vapour jet refrigeration system, working advantage and disadvantage .	2	1	NET		IM
17,18	Thermoelectric refrigeration system: working advantage and disadvantage.	2		R3	667	PPT, IM
19	Air refrigeration system: Working principle, advantage and disadvantages'	1		R3	550	GB
20,21	Vortex tube refrigeration system: Working principle, advantage and disadvantages.	1	1	R3	663	GB
22,23,24	Pulse tube and adiabatic refrigeration system: Working principle, advantage and disadvantages.	2	1	R3	92	PPT, IM
Evaluation : IA 1 & Model Exam		Total lecture hours		13		




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Format No.3b

	Sub Code : ME T73 Sub Name : Refrigeration ,Airconditioning and Cryogenics Engg Branch : MECHANICAL ENGINEERING Unit : III Semester: VII Title : Psychometric and Air conditioning (50% Theory & 50% Problematic)	LP Ver No: 01 Date:06.09.2022 Page: 03 of 06
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Objective: To understand Psychometric and Air conditioning with calculation

Session No	Topics to be covered	Period		Ref	Page No	Teaching Method
		L	T			
25,26	Psychometric : Property, chart, relation	2		R4	836	GB
27,28,29	Dalton's law : partial pressures – Wet bulb temperature and measurement – Adiabatic saturation temperature – Psychrometric processes .	2	1	R4	699	GB
30,31,32	Air-conditioning systems : : summer air-conditioning and winter air-conditioning – Requirement for comfort air-conditioning	3		R4	694	GB
33,34	Factors governing human comfort	2		NET		IM
Evaluation : IA 2 & Model Exam		Total lecture hours		10		




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RAAK COLLEGE OF ENGINEERING & TECHNOLOGY, PUDUCHERRY
LESSON PLAN

Format No.3b

	Sub Code : ME T73 Sub Name : Refrigeration ,Airconditioning and Cryogenics Engg Branch : MECHANICAL ENGINEERING Unit : IV Semester: VII Title : Cooling Load and Design of Air conditioning (50% Theory & 50% Problematic)	LP Ver No: 01 Date:06.09.2022 Page: 04 of 06
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Objective : To understand the concept of classification A/C and the retrieval purpose and load calculation,


Session No	Topics to be covered	Period		Ref	Page No	Teaching Method
		L	T			
35,36	LOAD : Heat load, Sun load, occupants load, infiltration load	2		R3	597	GB
37,38,39	ASHRAE standards Calculation of load on air-conditioning system	2		NET		IM
40,41	Air-conditioning systems: : Methods – centralized system, unitary system	3		R4	549	PPT, IM
42,43	Direct Air-Conditioning System	2		R3	550	GB
44,45,	Devices And Equipment: cleaners, air filters, humidifiers, fan cooling towers	2		R3	641-718	PPT,IM
Evaluation : IA 2 & Model Exam		Total lecture hours		11		




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LESSON PLAN

Format No.3b

	Sub Code : ME T55 Sub Name : Refrigeration ,Airconditioning and Cryogenics Engg Branch : MECHANICAL ENGINEERING Unit : V SEMESTER: VII Title : Liquefaction and Refrigeration system (75% Theory & 25% Problematic)	LP Ver No: 01 Date:06.09.2022 Page: 05 of 06

Objective : To Study About Cryogenics Liquefaction And Refrigeration Systems

Session No	Topics to be covered	Period		Ref	Page No	Teaching Method
		L	T			
46,47	Cryogenics: Introduction Applications involving cryogenic engineering – Cryogenic fluids and properties – Production of low temperature	2		R3	422	GB
48	Joule-Thomson: effect – Inversion curve – Adiabatic expansion	1		R3	435	GB
49,50,51,52	Cryogenic liquefaction systems: Linde-Hampson system, pre-cooled Linde-Hampson system, Linde dual pressure system, Claude system, pre-cooled Claude system, Kapitza system, Heylandt system, Collin's helium-liquefaction system and Simon helium-liquefaction system.	2	2	R2	444	PPT, GB
53	Engine Refrigeration system: Construction and working	1		NET		PPT, IM
54,55	Cold gas refrigeration system: Construction and working	1	1	NET		PPT,IM
56,57	Philips refrigerator – Solvay refrigerator – A. D. Little refrigerator – Vuilleumier refrigerator: Working principle	1	11	NET		PPT,IM
Evaluation : Model Exam		Total lecture hours		12		




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LESSON PLAN

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Course Delivery Plan:

Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Units	I		II		IA1	III		IV		IA2	V		REV. CLASS + MODEL EXAM		

Content beyond the Syllabus:

1. Review of different method of refrigeration system
2. Review of cooling load calculation and air conditioning system

Reference books:

1. Arora, C. P., Refrigeration and Air conditioning, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2000
2. Stoecker, W. F. and Jones, J. W., Refrigeration and Air conditioning, McGraw Hill Book Publishing Co. Ltd., New York, 1995
3. ASHRAE Equipment Handbook, The American Society of Heating, Refrigerating and Air-conditioning Engineers Inc., Atlanta, Georgia, 2001
4. Randall Barron, Cryogenic Systems, McGraw Hill Book Publishing Co. Ltd., New York, 1966
5. Timmerhaus, K. D. and Flynn, T. M., Cryogenic Process Engineering, Plenum Press, New York, 1989

Websites / Web courses:

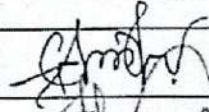
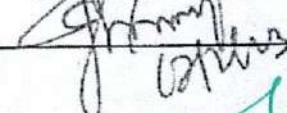
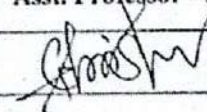
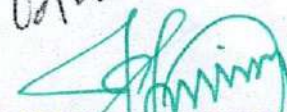
- http://www.iitg.ernet.in/scifac/qip/public_html/ed_cell/chapters/r_tiwari_dyn_of_mach/chapter_2_dyna mic%20force%20analysis.pdf
- <http://facultad.bayamon.inter.edu/elay/mecn4100/Chapter%202%20Free%20vibration%20of%20single %20degree%20of%20freedom.pdf>
- <http://www.freestudy.co.uk/dynamics/forced%20vibrations.pdf>
- <http://textofvideo.nptel.iitm.ac.in/112104114/lec19.pdf>

Videos:

- <http://nptel.iitm.ac.in/video.php?subjectId=112104114>
- <https://www.youtube.com/watch?v=p075LPq3Eas&list=PLBciMbMo6gh-Q96BDkncCLRbKfsN-Iyu6>

Topics for Innovative Teaching:

- Unit 1 Questionnaires, PPT
- Unit 2 Questionnaires, PPT
- Unit 3 Questionnaires, PPT
- Unit 4 Questionnaires, PPT
- Unit 5 Questionnaires, PPT

	Faculty incharge	Approved by	Signature
Name	Mr. G. KRISHNAKUMAR	HOD	
Designation	Asst. Professor - Mechanical	Principal	
Signature			



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