B. Tech. Mechanical Engineering (2007-08 onwards)

CURRICULUM

The minimum credit hours and distribution in accordance with the current syllabus are given in the following tables.

The following notations are used:

G – General programme comprising language/communication skills, humanities and social sciences, economics and principles of management, and NSS/NCC/NSO/YOGA
B – Basic Sciences comprising computer literacy, mathematics, physics, chemistry, biology, geology, and environmental science
E – Engineering Sciences and Technical Arts comprising engineering graphics, workshop practice, basic engineering, etc.
P – Professional Subjects corresponding to the branch of studies, which will include core subjects, electives, and project work
* – Audit course

L – Lecture Hours T – Tutorial Hours P – Practical Hours C – Credits

Semester I

Code	Category	Course	L	T	P	C
Theory						
LE0101	G	English	1	0	2	2
MA0101	B	Mathematics – I	3	2	0	4
PH0101	B	Physics	3	0	0	3
CY0101	B	Chemistry	3	0	0	3
GE0101	E	Basic Engineering – I	4	0	0	4
Practical						
PD0101	G	Personality Development – I*	0	0	2	0
GE0107	G	NSS / NCC / NSO / Yoga	0	0	2	1
GE0105	G	Computer Literacy	0	0	2	1
PH0103	B	Physics Laboratory	0	0	2	1
CY0103	B	Chemistry Laboratory	0	0	2	1
ME0120 / ME0130	E	Workshop Practice / Engineering Graphics	0/1	0	3/4	2/3
		Total	**14/15**	**2**	**15/16**	**22/23**
		Total Contact Hours	**31/33**			

Semester II

Code	Category	Course	L	T	P	C
Theory						
GE0108	G	Value Education	1	0	0	1
MA0102	B	Mathematics – II	3	2	0	4
GE0102	B	Biology for Engineers	2	0	0	2
GE0104	B	Principles of Environmental Science	2	0	0	2
PH0102	B	Materials Science	2	0	2	3

ME0102	E	Engineering Mechanics	3	2	0	4
GE0106	E	Basic Engineering – II	4	0	0	4
Practical						
PD0102	G	Personality Development – II*	0	0	2	0
ME0122	E	Computer Programming Practice	1	0	2	2
ME0130 / ME0120	E	Engineering Graphics / Workshop Practice	1/0	0	4/3	3/2
ME0124	B	Active Learning Laboratory	0	0	2	1
		Total	**19/18**	**4**	**12/11**	**26/25**
		Total Contact Hours	**35/33**			

Semester III

Code	Category	Course	L	T	P	C
Theory						
LE0201 / LE0203	G	German / Japanese Language Phase - I	2	0	0	2
MA0201	B	Mathematics – III	3	2	0	4
ME0201	E	Thermodynamics	2	2	0	3
IC0211	E	Electronics and Instrumentation	3	0	0	3
ME0203	P	Manufacturing Technology	3	0	0	3
ME0205	P	Fluid Mechanics	3	2	0	4
Practical						
PD0201	G	Personality Development - III	0	0	2	1
IC0217	E	Electronics and Instrumentation Laboratory	0	0	2	1
ME0221	P	Manufacturing Process Laboratory	0	0	2	1
ME0223	P	Fluid Dynamics Laboratory	0	0	2	1
		Total	**16**	**6**	**8**	**23**
		Total Contact Hours	**30**			

Semester IV

Code	Category	Course	L	T	P	C
Theory						
LE0202 / LE0204	G	German / Japanese Language - Phase II	2	0	0	2
MA0202	B	Numerical Methods	3	2	0	4
ME0204	P	Mechanics of Solids	3	2	0	4
ME0206	P	Applied Thermal Engineering	3	2	0	4
ME0208	P	Machines and Mechanisms	3	2	0	4
ME0210	P	Computer Aided Design and Analysis	3	0	0	3
Practical						
PD0202	G	Personality Development - IV	0	0	2	1
ME0222	P	Strength of Material Laboratory	0	0	2	1
ME0224	P	Computer Aided Design Laboratory	0	0	2	1
ME0226	P	Manufacturing and Assembly Drawing	1	0	3	2
		Total	**18**	**8**	**9**	**26**

Total Contact Hours	**35**	

Semester V

Code	Category	Course	L	T	P	C
Theory						
ME0301	P	Fundamentals of Vibration and noise	3	2	0	4
ME0303	P	Mechanical Engineering Design	3	2	0	4
ME0305	P	Heat and Mass Transfer	3	2	0	4
ME0307	P	Materials Technology	3	0	0	3
	P	Elective – I	3	0	0	3
Practical						
PD0301	G	Personality Development – V	1	0	2	2
ME0321	P	Machine Dynamics Laboratory	0	0	2	1
ME0323	P	Heat Power Laboratory	0	0	2	1
ME0325	P	Materials Technology Laboratory	0	0	2	1
ME0327	P	Comprehension – I	0	2	0	1
ME0329	P	Industrial Training – I [#]	0	0	0	1
ME0331 / -		Computer Skill[*] / -	0	0	4/-	2/-
		Total	**16**	**8**	**12/8**	**27/25**
		Total Contact Hours	**36/32**			

[#] An industrial training of minimum two weeks has to be undergone by the student in the winter / summer vacation of the III / IV semester.

[*] Each student shall undergo a minimum of 60 hours of training in one or more engineering software relevant to the branch of study.

Semester VI

Code	Category	Course	L	T	P	C
Theory						
ME0302	P	Gas Dynamics and Turbo Machinery	3	2	0	4
ME0304	P	Elements of Mechatronics	3	0	0	3
ME0306	P	Fluid Power Control	3	0	0	3
ME0308	P	Operations Research	2	2	0	3
	P	Elective – II	3	0	0	3
Practical						
PD0302	G	Personality Development - VI	1	0	2	2
ME0322	P	Automation Laboratory	0	0	2	1
ME0324	P	Heat and Mass Transfer Laboratory	0	0	2	1
ME0328	P	Comprehension – II	0	2	0	1
- / ME0331	P	- / Computer Skill[*]	0	0	- / 4	- / 2
		Total	**15**	**6**	**6/10**	**21/23**
		Total Contact Hours	**27/31**			

Semester VII

Code	Category	Course	L	T	P	C
Theory						
ME0401	G	Economics and Principles of Management	3	0	0	3
ME0403	P	Metrology and Quality Control	3	0	0	3
ME0405	P	Design of Transmission Systems	2	2	0	3
ME0407	P	Computer Aided Manufacturing	3	0	0	3
MA0460	B	Probability and Statistics	3	0	0	3
Practical						
ME0421	P	Metrology and Quality Control Laboratory	0	0	2	1
ME0423	P	Computer Aided Manufacturing Laboratory	0	0	2	1
ME0425	P	Industrial Training – II ##	0	0	0	1
		Total	**14**	**2**	**4**	**18**
		Total Contact Hours		**20**		

An industrial training of minimum two weeks has to be undergone by the student in the winter / summer vacation of the V / VI semester.

Semester VIII

Code	Category	Course	L	T	P	C
Theory						
	P	Elective III	3	0	0	3
	P	Elective IV	3	0	0	3
Practical						
ME0422	P	Project Work	0	0	17	8
		Total	**6**	**0**	**17**	**14**
		Total contact Hours		**23**		

LIST OF ELECTIVES

(Minimum of one each in Design, Manufacturing and Thermal category should be studied by each student)

Code	Course	L	T	P	C
	DESIGN				
ME0001	Finite Element Methods	3	0	0	3
ME0002	Robotics Engineering and Applications	3	0	0	3
ME0003	Mechanism Design, Analysis and Synthesis	3	0	0	3
ME0004	Digital Image Processing and Machine Vision	3	0	0	3
ME0005	Design for Manufacturing and Assembly	3	0	0	3
ME0006	Optimisation in Engineering Design	3	0	0	3
ME0007	Neural Network and Fuzzy Systems	3	0	0	3
ME0008	Industrial Tribology	3	0	0	3
	MANUFACTURING				
ME0021	Modern Manufacturing Techniques	3	0	0	3
ME0022	Precision Engineering	3	0	0	3
ME0023	Production Management	3	0	0	3

ME0024	Artificial Intelligence and Expert System	3	0	0	3
ME0025	Process Planning and Cost Estimation	3	0	0	3
ME0026	Tool Engineering Design	3	0	0	3
ME0027	Flexible Manufacturing Systems	3	0	0	3
ME0028	Non Traditional Machining Techniques	3	0	0	3
ME0029	Foundry Engineering	3	0	0	3
THERMAL					
ME0041	Combustion Engineering	3	0	0	3
ME0042	Gas Turbine Technology	3	0	0	3
ME0043	Boundary Layer Theory	3	0	0	3
ME0044	Fuel Cell Technology	3	0	0	3
ME0045	Elements of Space Technology	3	0	0	3
ME0046	Rocket Propulsion	3	0	0	3
ME0047	Refrigeration and Air Conditioning System	3	0	0	3
ME0048	Alternative Sources of Energy	3	0	0	3
ME0049	Energy Engineering and Management	3	0	0	3
ME0050	Design of Pumps and Turbines	3	0	0	3
ME0051	Computational Fluid Dynamics	3	0	0	3
ME0052	Internal Combustion Engines	3	0	0	3
AE0012	Automotive Electronics	3	0	0	3
GENERAL					
ME0061	Industrial Engineering	3	0	0	3
ME0062	Materials Management	3	0	0	3
ME0063	Human Relations Management	3	0	0	3
ME0064	Entrepreneurship Development	3	0	0	3
ME0065	Facilities Planning	3	0	0	3
ME0066	Industrial Safety and Environment	3	0	0	3
ME0067	Supply Chain Management	3	0	0	3
ME0068	TQM and Reliability Engineering	3	0	0	3
ME0069	Marketing and Sales Management	3	0	0	3
MH0307	PLC and Data Acquisition Systems	3	0	0	3
IC0461	Instrumentation and Control	3	0	0	3
IC0464	Microprocessor Based System Design	3	0	0	3

Category wise Distribution of Credits

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**	**%**
Total Credits	**22/23**	**26/25**	**23**	**26**	**27/25**	**21/23**	**18**	**14**	**177**	**100**
General	4	1	3	3	2	2	3	0	18	10.16
Basic Sciences	12	12	4	4	0	0	3	0	35	19.77
Engg. Sciences and Tech. Arts	6/7	13/12	7	0	0	0	0	0	26	14.68
Professional	0	0	9	19	25/23	19/21	12	14	98	55.36

SEMESTER I

		L	T	P	C
LE 0101	**ENGLISH**	**1**	**0**	**2**	**2**
	Prerequisite				
	Nil				

PURPOSE

To provide an adequate mastery of communicative English Language training primarily - reading and writing skills, secondarily listening and speaking skills.

INSTRUCTIONAL OBJECTIVES

To provide language training to the engineering students which will enable them to understand and acquire knowledge in technical subjects.

UNIT 1 LISTENING **3+5**

Listening Practice – Hints on Listening – Listening Practice

Note Taking: Note Taking Strategies

UNIT 2 SPEAKING **2+6**

Definitions: Expressing Opinions (agreement / disagreement)-Offering Suggestions – Technical Definitions – Describing Objects – speaking practice.

Phonetics: Pronunciation-Phonetic Transcription-Stress-Intonation

UNIT 3 READING **4+5**

Comprehension: Skimming-scanning-close reading-Comprehension – Transferring Information – Exercise – An unseen passage should be given and questions may be asked in the form of True or False statements, MCQ, short answers.

Transcoding : Interpreting tables, flow charts, piechart, bar diagram, tree diagram, graphs.

UNIT 4 WRITING **4+8**

Art of Writing : Writing Language – Rules for effective writing – Technical Essay Writing – Exercise

Report Writing : Technical Writing – Lab Report – Exercise

Letter Writing : Formal Letters – Letter to the Editor – Letter Inviting Dignitaries – Letter of Application Curriculum Vitae – Placing an Order.

Dialogue Writing

UNIT 5 FOCUS ON AND COMMUNICATION AND "COMPUNICATION" **2+6**

Communication : Basic Concepts – Process – Kinds – Routes – Forms – Factors – Barriers – Triangles Communication (Communicate through Computers – Power Point & Tele Conference).

INTERNAL ASSESSMENT

Based on the submission of Assignments and test performance of the students marks will be awarded.

TOTAL **45**

TEXT BOOKS

1. Abraham Benjamin Samuel 'Practical Communication Communicative English LSRW2000'– SRMEC – June 2006 Revised Edition.
2. Staff of the Department of Humanities and Social Science, Anna University, "English for Engineers / Technologist Vol.-I". Orient Longman, 1990.

REFERENCE BOOKS

1. Herbert. A. J. "The structure of Technical English" Orient Longman 1995.
2. Pickett and Laster, 'Technical English, Writing, Reading and Speaking', New York Harper and Row Publications, 1997.
3. "Interactive course in phonetics and spoken English" published by Acoustics Engineers(ACEN) 2002.
4. Munter, Mary, "Business Communication Strategy and Skill", Prentice Hall Inc.,New Jersey, 1987.

Course designed by		**Department of English and Foreign Languages**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**F**	**g**	**h**	**i**	**j**	**K**
								×				
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
		X										
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Mr. M.Alagesan**										

		L	**T**	**P**	**C**
MA 0101	**MATHEMATICS –I**	**3**	**2**	**0**	**4**
	Prerequisite				
	Nil				

PURPOSE

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

INSTRUCTIONAL OBJECTIVES

At the end of the course, student should be able, To apply advanced matrix knowledge to Engineering problems. To improve their ability in solving geometrical applications of differential calculus problems to equip themselves familiar with the functions of several variables. To familiarize with the applications of differential equations. To expose to the concept of three dimensional analytical geometry.

UNIT 1 MATRICES **9**

Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties of eigen values – Caley – Hamilton theorem – Orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformations.

UNIT 2 GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS **9**

Curvature – Cartesian and polar coordinates – Circle of curvature – Involutes and Evolutes – Envelopes – Properties of envelopes.

UNIT 3 FUNCTIONS OF SEVERAL VARIABLES **9**

Function of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangean Multiplier method – Jacobians

UNIT 4 ORDINARY DIFFERENTIAL EQUATIONS **9**

Simultaneous first order linear equations with constant coefficients – Linear equations of second order with constant and variable coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form.

UNIT 5 THREE DIMENSIONAL ANALYTICAL GEOMETRY **9**

Direction cosines and ratios – Angle between two lines – Equation of a plane – Equation of a straight line – Co-planar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal spheres.

TUTORIAL 30
TOTAL 75

TEXT BOOK

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition., Veerajan, T., Engineering Mathematics, Tata McGraw Hill Publishing Co., New Delhi,2000.
2. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan, Engineering Mathematics – Vol I & II Anuradha Publications, Revised Edition 2006.

REFERENCE BOOKS

1. Kreyszig.E, Advanced Engineering Mathematics, 8th edition, John Wiley & Sons. Singapore, 2001.
2. Kandasamy P etal. Engineering Mathematics, Vol.I (4th revised edition), S.Chand &Co., New Delhi, 2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., Advanced Mathematics for Engineering students, Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.
4. Venkataraman M.K., Engineering Mathematics – First Year (2nd edition), National Publishing Co., Chennai, 2000.

Course designed by		**Department of Mathematics**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	Mrs.S.Sangeetha										

		L	T	P	C
PH 0101	**PHYSICS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to develop scientific temper and analytical capability through learning physical concepts and their applications in engineering and technology. Comprehension of some basic physical concepts will enable the students to logically solve engineering problems.

INSTRUCTIONAL OBJECTIVES

At the end of the course, the student will be able to:

1. Understand the general scientific concepts required for technology,
2. Apply the concepts in solving engineering problems,
3. Explain scientifically the new developments in engineering and technology, and
4. Get familiarized with the concepts, theories, and models behind many technological applications.

UNIT 1 PROPERTIES OF MATTER AND SOUND **9**

Properties of Matter: Hooke's law – Twisting couple on a cylinder – Shafts – Torsion pendulum – Bending of beams – Bending moment – Uniform bending and non-uniform bending – I shape girder. **Sound:** Shock waves – Mach number (simple problems) – Ultrasonic production (magnetostriction and piezoelectric methods) and application – Acoustics of buildings – Sources and impacts of noise – Sound level meter – Control of noise pollution.

UNIT 2 ELECTROMAGNETISM AND MICROWAVES **9**

Electromagnetism: Divergence, curl and gradient – Maxwell's equations – Wave equation for electromagnetic waves – Propagation in free space – Poynting vector – Rectangular and circular wave guides. **Microwaves:** Properties and applications – Generation by magnetron and reflex klystron oscillator – Travelling wave tube – Biological effects.

UNIT 3 OPTICS **9**

Photometry: Principles and Lummer-Brodhun photometer. **Lasers:** Principles and characteristics – Types of lasers (CO_2, excimer, NdYAG, GaAs, free electron) – Holographic mass storage. **Optical Fiber:** Principles – Physical structure and types – Optical fiber communication. **Photoelasticity:** Theory and applications.

UNIT 4 CRYSTAL PHYSICS AND CRYOGENICS **9**

Crystal Physics: Crystal directions – Planes and Miller indices – Basic symmetry elements – Translational symmetry elements – Reciprocal lattice – Diamond and HCP crystal structure – Imperfections in crystals. **Cryogenics:** Methods of liquefaction of gases (cascade process, Linde's process, and adiabatic demagnetization process) – Measurement of cryogenic temperatures.

UNIT 5 ENERGY PHYSICS **9**

Introduction to non-conventional energy sources – Solar cells – Thermoelectric power generators – Thermionic power generator – Magneto hydrodynamic power generator – Fuel cells (H_2O_2) – Solid state batteries (Lithium) – Low voltage and high voltage nuclear cells – Thermocouple based nuclear cell – Ultra capacitors.

TOTAL **45**

TEXT BOOKS

1. Arumugam, M., Engineering Physics, 2nd edition, Anuradha Publishers, Kumbakonam, 2003.
2. Gaur and Gupta, Engineering Physics, 7th edition, Dhandapani and Sons, New Delhi, 1997.
3. Thiruvadigal, J. D., Ponnusamy, S., Vasuhi, P. S. and Kumar, C., Physics for Technologists, 5th edition, Vibrant Publication, Chennai, 2007.

REFERENCE BOOKS

1. Vasudeva, A. S., Modern Engineering Physics, S. Chand and Company Ltd., New Delhi, 2004.
2. Vasudevan, D. N., Fundamentals of Magnetism and Electricity, 11th edition, S. Chand and Company Ltd., New Delhi, 1983.
3. Nair, K. P. R., Atoms, Molecules and Lasers, Narosa Publishing House, New Delhi, 2006.
4. Pillai, S. O., Solid State Physics,5th edition, New Age International (P) Ltd., New Delhi, 2004.
5. Khan, B. H., Non-Conventional Energy Resources, Mechanical Engineering Series, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.

Course designed by		Department of Physics										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	K
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
				X								
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Dr.S.Nithyanantham										

		L	T	P	C
CY 0101	CHEMISTRY	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

INSTRUCTIONAL OBJECTIVES

The students should be conversant with

1. The role of applied chemistry the field of engineering.
2. The knowledge of water quality parameters and the treatment of water.
3. The principles involves in corrosion and its inhibitions.
4. Important analytical techniques, instrumentation and the applications.
5. Knowledge with respect to the phase equlibria of different systems.

UNIT 1 TECHNOLOGY OF WATER **9**

Water quality parameters: Physical, Chemical & Biological - Hardness of water – estimation of hardness (EDTA method & O. Hehner"s method), Alkalinity – determination – disadvantages of using hard water in boilers: Scale, sludge formation – disadvantages – prevention – treatment: Internal conditioning – phosphate, calgon and carbonate conditioning methods – External: Zeolite, ion exchange methods - desalination – reverse osmosis and electrodialysis - domestic water treatment.

UNIT 2 CORROSION AND ITS CONTROL **9**

Corrosion: Basic concepts – principles, mechanism of chemical, electrochemical corrosion – Pilling Bedworth rule – galvanic corrosion – differential aeration corrosion - pitting corrosion - stress corrosion - factors influencing corrosion.

Corrosion control: cathodic protection – sacrificial anodic method – corrosion inhibitor. Protective coatings: surface preparation for metallic coatings - electro plating and electroless Plating - chemical conversion coatings – anodizing, phosphating & chromate coating.

UNIT 3 PHASEEQUILIBRIA **9**

Phase rule: Statement – explanation of the terms involved - one component system (water system only). Condensed phase rule - thermal analysis – two component systems: simple eutectic, Pb-Ag; Br, Cd - solid solution Cu-Ni and compound formation Mg-Zn - applications of eutectics.

UNIT 4 POLYMERS AND REINFORCED PLASTICS **9**

Classification of polymers – types of polymerization reactions – mechanism of addition polymerization: free radical, ionic and ziegler – Natta - effect of structure on the properties of polymers – strength, plastic deformation, plastics elasticity and physical nature –Preparation and properties of important resins:- Polyethylene, PVC, PMMA, Polyester, Teflon Bakelite, Epoxy resins, compounding of plastics, moulding methods - injection, extrusion, compression and calendaring - reinforced plastics – FRP – Carbon, Graphite, Glass– applications.

UNIT 5 INSTRUMENTAL METHODS OF ANALYSIS **9**

Basic principles, instrumentation of potentiometry, flame photometry – applications. Elementary theory – principle – instrumentation of UV – visible spectroscopy and atomic absorption spectroscopy and infrared spectroscopy.

TOTAL 45

TEXT BOOKS

1. Jain.P.C and Monika Jain, "Engineering Chemistry", Danpat Raj publishing company (P) Ltd, New Delhi – 2002.
2. Dara.S.S, Text book of Engineering Chemistry, S. Chand & Company Ltd, New Delhi 2003.
3. Willard H.A., Merit L.L and Dean J.A., "Instrumental methods of analysis" 6th Edition Van Nostrand, 1986.

REFERENCE BOOKS

1. Kuriacose J.C. and Rajaram J. Chemistry in Engineering and Technology, Volume II, Tata McGraw Hill p.b. Co., 1988.
2. Jeyalakshmi.R & Ramar. P, Engineering Chemistry, 1st Edition, Devi Publications, Chennai 2006.
3. Kamaraj.P & Arthanareeswari. M, Applied Chemistry, 2nd Edition, Sudhandhira Publications, 2003.
4. Arivalagan. K, Engineering Chemistry, 1st Edition, Mass publications, 2007.
5. P.Kamatchi, Applied Chemistry-I, Ponnuswamy publications, Chennai.
6. Dr. Helen P Kavitha Engineering Chemistry - I ILA Publications, 2002

Course designed by		**Department of Chemistry**										
1	**Student Outcome**	**a**	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	Dr.B.Natarajan										

		L	T	P	C
GE0101	**BASIC ENGINEERING – I**	**4**	**0**	**0**	**4**
	Prerequisite				
	Nil				

PART A CIVIL ENGINEERING

PURPOSE

To get exposed to the glimpses of Civil Engineering topics that is essential for an Engineer.

INSTRUCTIONAL OBJECTIVES

1. To know about different materials and their properties.
2. Engineering aspects related to buildings.
3. To know about importance of Surveying.
4. To know about the transportation systems.
5. To get exposed to the rudiments of engineering related to Dams, Water Supply, Transportation system and Sewage Disposal.

UNIT 1 BUILDING MATERIALS AND THEIR PROPERTIES **10**

Introduction - Civil Engineering – Building Materials – Brick, Stone, Cement, Steel, Concrete, timber – Properties – Uses. Units – Stress, strain and three modulii of elasticity – factor of safety - Centre of Gravity and Moment of Inertia for rectangle and circular section – simple problems.

UNIT 2 BUILDINGS AND THEIR COMPONENTS **10**

Buildings – Classification - Components of buildings and their functions Foundations - functions – classification of foundations – Bearing capacity Floorings – functions - Types - Cement Concrete flooring – Mosaic flooring - Marble flooring Roofs - Types – Requirements – Madras Terrace roof. Tall structure – types of structural systems.

UNIT 3 UTILITY AND SERVICES **10**

Surveying - Objective – Principles – Classification – Instruments used for Surveying. Dams - Purpose – Selection of site – Classification – Gravity dam (cross-section details only) Transportation system - Classification – Roadway - components – classification of roads - Railway – Cross-section of permanent way-components parts and functions. Docks and Harbour – classification – Terminology Bridges –components of a bridge - types of bridges.Water supply - Sources - Standards of drinking water (BIS) – elementary treatment methods – RO System Sewage disposal – Septic tank – function and components.

TOTAL **30**

TEXT BOOKS

1. Raju K.V.B., Ravichandran P.T., Basics of Civil Engineering, Ayyappa Publications, Chennai, 2000.
2. Ramesh Babu, Civil Engineering , VRB Publishers, Chennai, 2000.

REFERENCE BOOKS

1. Rangwala,S.C., Engineering Materials, Charotar Publishing House, Anand, 1980.
2. National Building Code of India, Part V, Building Materials, 2005
3. Surendra Singh, Building Materials, Vikas Publishing Company, New Delhi, 1996

Course designed by		Department of Civil Engineering										
1	Student Outcome	a	B	c	d	e	f	g	h	i	j	K
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)		
						X						
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Ms.T.V.Preethi										

PART B MECHANICAL ENGINEERING

PURPOSE

To familiarize the students with the basics of Mechanical Engineering.

INSTRUCTIONAL OBJECTIVES

To familiarize with

1. The basic machine elements
2. The Sources of Energy and Power Generation
3. The various manufacturing processes

UNIT 1 MACHINE ELEMENTS **10**

Springs: Helical and leaf springs – Springs in series and parallel. **Cams:** Types of cams and followers – Cam profile.

Power Transmission: Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. **Simple Problems.**

UNIT 2 ENERGY **10**

Sources: Renewable and non-renewable (various types, characteristics, advantages/disadvantages). **Power Generation:** External and internal combustion engines - Hydro and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). **Simple Problems.**

UNIT 3 MANUFACTURING PROCESSES **10**

Sheet Metal Work: Introduction – Equipments – Tools and accessories – Various processes (applications, advantages / disadvantages). **Welding:** Types – Equipments – Tools and accessories – Techniques employed (applications, advantages / disadvantages (gas and arc welding only)) – Gas cutting – Brazing and soldering. **Lathe Practice:** Types - Description of main components – Cutting tools – Work holding devices – Basic operations. **Simple Problems**. **Drilling Practice:** Introduction – Types – Description – Tools. **Simple Problems**.

TOTAL 30

TEXT BOOKS

1. Kumar, T., Leenus Jesu Martin and Murali, G., *Basic Mechanical Engineering*, Suma Publications, Chennai, 2007.
2. Prabhu, T. J., Jai Ganesh, V. and Jebaraj, S., *Basic Mechanical Engineering*, Scitech Publications, Chennai, 2000.

REFERENCE BOOKS

1. Hajra Choudhary, S.K. and Hajra Choudhary, A. K., *Elements of Manufacturing Technology Vols. I & II*, Media Publishers, 1986.
2. Nag, P.K., *Power Plant Engineering*, Tata McGraw-Hill, New Delhi, 2006.
3. Palanichamy, M.S., *Basic Civil & Mechanical Engineering*, Tata McGraw-Hill, New Delhi 1991.
4. Nagpal G. R., *Power Plant Engineering*, Khanna Publisher, Delhi, 2004.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
		X				**X**						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
						X						
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Mr.P.Sudhakar**										

PD 0101	**PERSONALITY DEVELOPMENT - I**	**L**	**T**	**P**	**C**
	Prerequisite	**1**	**0**	**1**	**0**
	Nil				

PURPOSE

To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES

To guide thought process

1. To groom students' attitude
2. To develop communication skill
3. To build confidence

SOFT SKILL - 1

UNIT – I

Self Analysis

UNIT- II

Attitude and Change Management

UNIT – III

Motivation

UNIT – IV
Goal Setting and Time Management

UNIT – V
Creativity

TEXT BOOK
1. INSIGHT, Career Guidance Cell, SRM Publications Chennai, 2009.

REFERENCE BOOKS
1. Convey Sean., Seven Habit of Highly Effective Teens, New York, Fireside Publishers, 1998.
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.

PD 0101 - PERSONALITY DEVELOPMENT - I											
Course designed by	Department of Career Development Centre										
Student outcomes	**a**	**B**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
						x	**x**		**x**		
Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)		
	x										
Course Coordinator	Ms.B.Revathi										

		L	**T**	**P**	**C**
GE0107	**NSS/NCC/NSO/YOGA**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

I. YOGA SYLLABUS

	PRACTICE	**LECTURE**
I	Meditation – Agnai, Asanas, Kiriyas, Bandas, Muthras	Benefits of Agnai Meditation
II	Meditation Santhi Physical Exercises (I & II)	Benefits of santhi Meditation
III	Kayakalpa Yoga Asanas, Kiriyas, Bandas, Muthras	Lecture & Practice
IV	Meditation Santhi Physical Exercises III & IV	Analysis of Thought
V	Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras	Benefits of Thuriyam
VI	Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras	Attitude
VII	Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras	Importance of Arutkappy & Blessings
VIII	Meditation Santhi Kayakalpa Asanas, Kiriyas, Bandas, Muthras	Benefits of Blessings
		Hours = 30

TEXT BOOKS:

1. Vedatri Maharshi , “Yoga for Modern Age”
2. Vedatri Maharshi, “ Simplified Physical Exercises”

II. NATIONAL SPORTS ORGANISATION (NSO)

Each student must select two of the following games and practice for two hours per week. An attendance of 80% is compulsory to earn the credits specified in the curriculum.

List of games:

1.	Basket Ball
2.	Football
3.	Volley Ball
4.	Ball Badminton
5.	Cricket
6.	Throwball

III. NATIONAL CADET CORPS (NCC)

Any student enrolling as a member of National Cadet Corps (NCC) will have to attend sixteen parades out of twenty parades each of four periods over a span of academic year.

Attending eight parades in first semester will qualify a student to earn the credits specified in the curriculum.

IV. NATIONAL SERVICE SCHEME (NSS)

A student enrolling as member of NSS will have to complete 60 hours of training / social service to be eligible to earn the credits specified in the curriculum.

Course designed by		**Department of NCC & NSS**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
							×	×		×		
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
		X										
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Prof.K.Shanmugam & Prof.L.R.Ganapathy subramaniyam**										

		L	T	P	C
GE0105	**COMPUTER LITERACY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

This Lab Course will enable the students to understand the basics of computer and to know the basics of MS-Office.

INSTRUCTIONAL OBJECTIVES

1. To learn the basics of computer.
2. To work on Ms-Word, Ms-Excel, Ms-Power Point and Ms-Access

EXPERIMENTS TO IMPLEMENT

Study experiment on evolution of computer programming languages.

1. Suggest some of the Network Topologies that can be incorporated in your campus. Justify your choice.
2. Experiments to demonstrate directory creation and file creation.
3. Create a document with all formatting effects.
4. Create a document with tables.
5. Create labels in MS word.
6. Create a document to send mails using mail merge option.
7. Create an Excel File to analyze the student's performance. Create a chart for the above data to depict it diagrammatically.
8. Create Excel sheet to use built-in-function.
9. Create Excel sheet to maintain employee information and use this data to send mails using mail merge.
10. Create a Power Point presentation for your personal profile with varying animation effects with timer.
11. Consider student information system which stores student personal data, mark information and non academic details.
    * Use MS Access to create Tables and execute SQL queries to do this following
    * Display all student records.
    * Display student details with respect to his identity.
    * Delete some records from the table.
    * Find total marks obtained by student in each list.

TOTAL 30

TEXT BOOK

1. "Introduction to Information Technology" ITL Education Solutions Ltd., Pearson 2nd Edition, 2006.

Course designed by		Department of Computer Science Department										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	K
		×								×		×
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)			PROFESSIONAL SUBJECTS (P)		
				X								
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Mrs.S.Metilda Florence										

		L	T	P	C
PH 0103	PHYSICS LABORATORY	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to develop scientific temper and analytical capability among the engineering students.

INSTRUCTIONAL OBJECTIVES

At the end of the course, the student will be able to:

1. Understand scientific concepts in measurement of different physical variables
2. Develop the skill in arranging and handling different measuring instruments and
3. Get familiarized with the errors in various measurements and planning / suggesting how these contributions may be made of the same order so as to make the error in the final result small.

LIST OF EXPERIMENTS

1. Determination of Young's Modulus of the material – Uniform bending
2. Determination of Rigidity Modulus of the material – Torsion Pendulum
3. Determination of velocity of Ultrasonic waves in liquids
4. Determination of dispersive power of a prism using spectrometer
5. Determination of laser parameter – Divergence and wavelength for a given laser source – laser grating
6. Particle size determination using laser
7. Study of attenuation and propagation characteristics of optical fiber cable
8. Calibration of voltmeter using potentiometer.
9. Calibration of ammeter using potentiometer.
10. Construction and study of regulation properties of a given power supply using IC

TOTAL 30

REFERENCE BOOKS

1. Chattopadhyay, D., Rakshit, P. C. and Saha, B., An Advanced Course in Practical Physics, 2nd edition, Books & Allied Ltd., Calcutta, 1990.
2. Chauhan and Singh, Advanced Practical Physics, Revised edition, Pragati Prakashan, Meerut, 1985.
3. Thiruvadigal. J. D., Ponnusamy. S., Vasuhi. P. S. and Kumar. C, Hand Book of Practical Physics, 5th edition, Vibrant Publication, Chennai, 2007.

Course designed by		Department of Physics										
1	Student Outcome	a	b	c	D	e	f	g	h	i	j	K
		×	×			×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
				X								
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Dr.R.Gopalakrishnan										

		L	T	P	C
CY 0103	CHEMISTRY LAB	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

An integrated laboratory course consists of experiments from applied chemistry and is designed to illustrate the underlying principles of measurement techniques, synthesis, dynamics and chemical transformation.

INSTRUCTIONAL OBJECTIVES

Students should be able to understand the basic concept and its applications.

LIST OF EXPERIMENTS

1. Preparation of standard solutions.
2. Estimation of total hardness, permanent and temporary hardness by EDTA method.
3. Conductometric titration – determination of strength of an acid.
4. Estimation of iron by potentiometer – titration.
5. Determination of molecular weight of polymer by viscosity average – method.
6. Determination of dissolved oxygen in a water sample by Winkler"s method
7. Determination of Na / K in water sample by Flame photometry.
8. Estimation of Copper in ore.
9. Estimation of nickel in steel.
10. Determination of total alkalinity and acidity of a water sample.

TOTAL 30

REFERENCE

1. Chemistry department manual, Edition, 2003.

Course designed by		Department of Chemistry										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	K
		×	×			×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
				X								
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Dr.Srinivasan Latha										

		L	T	P	C
ME0120	WORKSHOP PRACTICE	0	0	4	2
	Prerequisite				
	Nil				

PURPOSE

To provide the students with hands on experience on different trades of engineering like fitting, carpentry, smithy, welding and sheet metal.

INSTRUCTIONAL OBJECTIVES

To familiarize with

1. The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
2. The production of simple models in the above trades.

UNIT 1 FITTING **12**

Tools & Equipments – Practice in Filing and Drilling.
Making Vee Joints, Square, Dovetail joints and Key making.

UNIT 2 CARPENTARY **12**

Tools and Equipments- Planning practice.
Making Half Lap, Dovetail, Mortise & Tenon joints, A mini model of a single door window frame.

UNIT 3 SHEET METAL **12**

Tools and equipments -
Fabrication of a small cabinet, Rectangular Hopper, etc.

UNIT 4 WELDING **12**

Tools and equipments -
Arc welding of butt joint, Lap joint, Tee fillet.
Demonstration of gas welding, TIG & MIG welding.

UNIT 5 SMITHY **12**

Tools and Equipments –
Making simple parts like hexagonal headed bolt, chisel.

TOTAL 60

TEXT BOOK

1. Gopal, T.V., Kumar, T., and Murali, G., *A first course on workshop practice – Theory, Practice and Work Book*, Suma Publications, Chennai, 2005.

REFERENCE BOOKS

1. Kannaiah,P., and Narayanan, K. C., *Manual on Workshop Practice*, Scitech Publications, Chennai, 1999.
2. Venkatachalapathy, V. S., *First year Engineering Workshop Practice*, Ramalinga Publications, Madurai, 1999.
3. Laboratory Manual.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
			×	×				×				
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
						X						
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	Dr.M.Gopal										

		L	**T**	**P**	**C**
ME0130	**ENGINEERING GRAPHICS**	**1**	**0**	**4**	**3**
	Prerequisite				
	Nil				

(Only First Angle Projection is to be followed)

PURPOSE

1. To draw and interpret various projections of 1D, 2D and 3D objects.
2. To prepare and interpret the drawings of buildings.

INSTRUCTIONAL OBJECTIVES

To familiarise with

1. The construction of geometrical figures
2. The projection of 1D, 2D and 3D elements
3. Sectioning of solids and development of surfaces
4. Preparation and interpretation of building drawing

UNIT 1 FUNDAMENTALS OF ENGINEERING GRAPHICS **2**

Lettering – Two dimensional geometrical constructions – Conics – Representation of three-dimensional objects – Principles of projections – Standard codes – Projection of points.

UNIT 2 PROJECTION OF LINES AND SOLIDS **4**

Projection of straight lines – Projection of solids – Auxiliary projections.

UNIT 3 SECTIONS AND DEVELOPMENTS **3**

Sections of solids and development of surfaces.

UNIT 4 PICTORIAL PROJECTIONS **4**

Conversion of Projections: Orthographic projection – Isometric projection of regular solids and combination of solids.

UNIT 5 BUILDING DRAWING **2**

Plan, Elevation and section of single storied residential (or) office building with flat RCC roof and brick masonry walls having not more than 3 rooms (planning / designing is not expected in this course).

PRACTICAL **60**
TOTAL **75**

TEXT BOOKS

1. Venugopal, K. and Prabhu Raja, V., *Engineering Graphics*, Eighth Edition (Revised), New Age International Publishers, Chennai, 2007.
2. Natarajan, K.V., *A Text Book of Engineering Graphics*, 21st Edition, Dhanalakshmi Publishers, Chennai, 2007
3. Jeyapoovan, T., *Engineering Drawing and Graphics using AutoCAD 2000*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

REFERENCE BOOKS

1. Bhatt, N.D., *Elementary Engineering Drawing (First Angle Projection)*, Charotar Publishing Co., Anand, 1999.
2. Narayanan, K. L. and Kannaiah, P., *Engineering Graphics*, Scitech Publications, Chennai, 1999.
3. Shah, M. B. and Rana, B. C., *Engineering Drawing*, Pearson Education (Singapore) Pvt. Ltd., New Delhi , 2005.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
			×	×				×				
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
							X					
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	Mr.J.Thavamani										

SEMESTER II

		L	T	P	C
GE 0108	**VALUE EDUCATION**	**1**	**0**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE

To provide guiding principles and tools for the development of the whole person, recognizing that the individual is comprised of Physical Intellectual, Emotional and Spiritual dimensions.

INSTRUCTIONAL OBJECTIVES

1. To help individuals think about and reflect on different values.
2. To deepen understanding, motivation and responsibility with regard to making personal and social choices and the practical implications of expressing them in relation to themselves, others, the Community and the world at large.
3. To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening them.

UNIT 1 **3**

Value Education—Introduction – Definition of values – Why values? – Need for Inculcation of values – Object of Value Education – Sources of Values – Types

Values:

i) Personal values
ii) Social values
iii) Professional values
iv) Moral and spiritual values
v) Behavioral (common) values

UNIT 2 **3**

Personal values – Definition of person – Self confidence – Self discipline – Self Assessment – Self restraint – Self motivation – Determination – Ambition – Contentment – Humility and Simplicity - Sympathy and Compassion – Gratitude -Forgiveness – Honesty – Courtesy.

UNIT 3 **3**

Social values – Definition of Society – Units of Society - Individual, family, different groups – Community – Social consciousness – Equality and Brotherhood – Dialogue – Tolerance – Sharing – Responsibility – Co-operation Freedom – Repentance and Magnanimity.

UNIT 4 **3**

Professional values – Definition – Competence – Confidence – Devotion to duty –Efficiency – Accountablility – Respect for learning /learned – Willingness to learn-Open and balanced mind – Team spirit – Professional Ethic – Willingness for Discussion – Aims – Effort – Avoidance of Procrastination and slothfulness –Alertness.

UNIT 5 **3**

Behavioral values – Individual values and group values – Good manners at home and outside – Equality – Purity of thought, speech and action – Understanding the role of religion – Faith – Understanding the commonness of religions – respect for other faiths – unity in diversity – Living together – Tolerance – Non-violence – Truthfulness – Common aim – Unified effort towards peace – Patriotism.

TOTAL 15

REFERENCE BOOKS

1. Dr. S. Ignacimuthu S. J., Values for life, Better yourself Books, Bandra Mumbai-600 050 (1999).
2. Values(Collection of Essays)., Published by : Sri Ramakrishna Math., Chennai—4.,(1996)

3. Prof. R.P.Dhokalia., Eternal Human Values NCRT –Campus Sri Aurobindo Marg., New Delhi - 110 011.
4. Swami Vivekananda., Education., Sri Ramakrishna Math., Chennai-4(1957)
5. Tirukural (English Translation by Dr.G.U.Pope).
6. The Bible
7. The Kuran
8. The Bagavath Geetha

Course designed by		Department of Carriers Guidance Cell										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	K
							×			×		
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)			PROFESSIONAL SUBJECTS (P)			
		X										
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Ms.B.Monika Nair										

		L	T	P	C
MA 0102	MATHEMATICS - II	3	2	0	4
	Prerequisite				
	MA0101 - MATHEMATICS - I				

(Common to all Branches of Engineering except BT, BP, BI, BMI, FPE, & GE)

PURPOSE

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

INSTRUCTIONAL OBJECTIVES

At the conclusion of the course, students should have understood Multiple Integrals , Laplace Transforms, Vector Calculus and Functions of a complex variable including contour integration and able to apply to all their Engineering problems.

UNIT 1 MULTIPLE INTEGRALS **9**

Double integration in Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in Cartesian coordinates.

UNIT 2 LAPLACE TRANSFORMS **9**

Transforms of simple functions – Basic operational properties – Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – periodic functions – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.

UNIT 3VECTOR CALCULUS **9**

Gradient, divergence, curl – Solenoidal and irrotational fields – Vector identities (without proof) – Directional derivatives – Line, surface and volume integrals – Statements of Green's, Gauss divergence and Stroke's theorems only – Verification and applications to cubes and parallelopipeds only.

UNIT 4 ANALYTIC FUNCTIONS **9**

Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions - Determination of harmonic conjugate – Milne-Thomson's method – Conformal mappings: 1/z, az az+b and bilinear transformation.

UNIT 5 COMPLEX INTEGRATION **9**

Line integral – Cauchy's integral theorem (without proof) – Cauchy's integral formulae (with proof) – application of Cauchy's integral formulae – Taylor's and Laurent's expansions (statements only) – Singularities – Poles and Residues – Cauchy's residue theorem (with proof) - Evaluation of line integrals.

TUTORIAL **30**

TOTAL **75**

TEXT BOOK

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition.
2. Veerajan, T., Engineering Mathematics, Tata McGraw Hill Publishing Co., New Delhi,2000.
3. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan, Engineering Mathematics – Vol I & II Anuradha Publications, Revised Edition 2006.

REFERENCE BOOKS

1. Kreyszig.E, Advanced Engineering Mathematics, 8th edition, John Wiley & Sons. Singapore,2001.
2. Kandasamy P etal. Engineering Mathematics, Vol.I (4th revised edition), S.Chand &Co., New Delhi,2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., Advanced Mathematics for Engineering students, Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.
4. Venkataraman M.K., Engineering Mathematics – First Year (2nd edition), National Publishing Co., Chennai,2000.

Course designed by		**Department of Mathematics**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
3	**Broad area (for professional courses only, i.e 'under P' category)**											
4	**Course Coordinator**	Mrs.E.Sujatha										

		L	T	P	C
GE 0102	**BIOLOGY FOR ENGINEERS**	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

To provide a basic understanding of biological mechanisms from the perspective of engineers.

INSTRUCTIONAL OBJECTIVES

To familiarize the students with the basic organization of organisms and subsequent building to a living being. With this knowledge, the student will be then imparted with an understanding about the machinery of the cell functions that is ultimately responsible for arious daily activities. Nervous and immune systems will be taught as examples of this signaling machinery.

UNIT 1 FROM ATOMS TO ORGANISMS **6**

The Cell: the Basic Unit of Life - Molecular Components of Cells - Expression of Genetic Information - Protein Structure and Function- Cell Metabolism - Cells Maintain Their Internal Environments - Cells Respond to Their External Environments - Cells Grow and Reproduce - Cells Differentiate

UNIT 2 THE MOLECULAR DESIGN OF LIFE **6**

Biochemistry and the Genomic Revolution- . DNA Illustrates the Relation between Form and Function-Biochemical Unity Underlies Biological Diversity-. Chemical Bonds in Biochemistry -. Biochemistry and Human Biology-. Protein Synthesis Requires the Translation of Nucleotide Sequences Into Amino Acid Sequences-.2. Aminoacyl-Transfer RNA Synthetases Read the Genetic Code- A Ribosome Is a Ribonucleoprotein Particle (70S) Made of a Small (30S) and a Large (50S) Subunit-Protein Factors Play Key Roles in Protein Synthesis-. Eukaryotic Protein Synthesis Differs from Prokaryotic Protein Synthesis Primarily in Translation Initiation

UNIT 3 CATALYTIC STRATEGIES **6**

Proteases: Facilitating a Difficult Reaction-. Making a Fast Reaction Faster: Carbonic Anhydrases-. Restriction Enzymes: Performing Highly Specific DNA-Cleavage Reactions- Nucleoside Monophosphate Kinases: Catalyzing Phosphoryl Group Exchange between Nucleotides Without Promoting Hydrolysis- metabolism-anabolism and catabolism-photosynthesis and carbon fixation- biological energy production.

UNIT 4 MECHANOCHEMISTRY **6**

How Protein Motors Convert Chemical Energy into Mechanical Work- Brief Description of ATP Synthase Structure- The F1 Motor: A Power Stroke-A Pure Power Stroke- Coupling and Coordination of Motors-Measures of Efficiency- F1-Motor of ATP synthase- The Bacterial Flagellar Motor- Motor Driven by H_ and Na_ Ion Flux- Proton Motive Force, Sodium-motive Force, Ion Flux- Molecular Motor Directionality- Chimeric Kinesin Motors- Backwards Myosins- Chimeric Myosin Motors- Bidirectional Dyneins?

UNIT 5 SENSORY AND IMMUNO SYSTEMS **6**

General Principles of Cell Signaling-Signaling via G-Protein-linked Cell-Surface Receptors-Signaling via Enzyme-linked Cell-Surface Receptors-Target-Cell Adaptation-The Logic of Intracellular Signaling: Lessons from Computer-based "Neural Networks"-The Cellular Basis of Immunity-The Functional Properties of Antibodies-The Fine Structure of Antibodies-The Generation of Antibody Diversity-T Cell Receptors and Subclasses-MHC Molecules and Antigen Presentation to T Cells-Cytotoxic T Cells-Helper T Cells and T Cell Activation-Selection of the T Cell Repertoire

TOTAL 30

TEXT BOOK

1. J.M.Berg, J.L.Tymosczko and L.Sryer. Biochemistry,W.H. Freeman Publications.
2. **STUDENT COMPANION** to accompany **Biochemistry, Fifth Edition -Richard I. Gumport**
3. **Frank H. Deis, Nancy Counts Gerber, Roger E. Koeppe, II** Molecular motors

REFERENCE BOOKS:

1. Alberts, 2003 Molecular Biology of the cell
2. Lodish, 2004 Molecular cell biology

Course designed by		Department of Biotechnology										
1	Student Outcome	a	B	c	d	e	f	g	h	i	j	K
		x										
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)			PROFESSIONAL SUBJECTS (P)		
				X								
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Dr.S.Sujatha										

		L	T	P	C
GE 0104	PRINCIPLES OF ENVIRONMENTAL SCIENCE	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

The course provides the comprehensive knowledge in environmental science, environmental issues and the management.

INSTRUCTIONAL OBJECTIVES

1. The importance of environmental education, ecosystem and ethics.
2. Knowledge with respect to biodiversity and its conservation.
3. To create awareness on the various environmental pollution aspects and issues.
4. To educate the ways and means to protect the environment.
5. Important environmental issues and protection

UNIT 1 ENIVRONMENT AND ECOSYSTEMS **6**

Environmental education: definition - scope - objectives and importance. Concept of an ecosystem – types (terrestrial and aquatic ecosystems) – structure and function – ecological succession - food chains, food webs and ecological pyramids

UNIT 2 BIODIVERSITY **6**

Introduction: definition - genetic, species and ecosystem diversity - value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - threats to biodiversity: habitat loss, poaching of wildlife - endangered and endemic species of India, Conservation of biodiversity: in-situ and ex-situ conservations.

UNIT 3 POLLUTION AND WASTE MANAGEMENT **6**

Air and water pollution – classification of pollutants and their effects – control measures of air pollution. Waste water treatment (general) – primary, secondary & tertiary stages. Solid waste management: causes - effects of municipal waste, hazardous waste, bio medical waste - process of waste management.

UNIT 4 CURRENT ENVIRONMENTAL ISSUES **6**

Environmental ethics -issues and possible solutions- population explosion, climatic change, ozone layer depletion, global warming, acid rain and green house effect. Sustainable development: definition, objectives and environmental dimensions of sustainable development- environmental audit for sustainable development.

UNIT 5 ENVIRONMENTAL PROTECTION **6**

National and international concern for environment: Important environmental protection acts in India – water, air (prevention and control of pollution) act, wild life conservation and forest act – functions of central and state pollution control boards - international effort – key initiatives of Rio declaration, Vienna convention, Kyoto protocol and Johannesburg summit.

TOTAL 30

TEXT BOOKS

1. Sharma.B.K. and Kaur, "Environmental Chemistry"" Goel Publishing House, Meerut, 1994.
2. De.A.K., "Environmental Chemistry", New Age International (p) lt., , New Delhi, 1996.
3. Kurian Joseph & R. Nagendran, "Essential of Environmental Studies"" Pearson Education, 2004.

REFERENCE BOOKS

1. Dara S.S., A Text Book of Environmental Chemistry and pollution control, S.Chand & Company Ltd., New Delhi, 2004.
2. Jeyalakshmi.R, Principles of Environmental Science, 1st Edition, Devi Publications, Chennai 2006.
3. Kamaraj.P & Arthanareeswari.M, Environmental Science – Challenges and Changes, 1st Edition, Sudhandhira Publications, 2007.
4. Arivalagan.K, Ramar.P & Kamatchi.P, Principles of Environmental Science, 1st Edition, Suji Publications, 2007.

Course designed by		**Department of Chemistry**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
		×		×					×	×		
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**			**Thermal**		**Genaral**			
4	**Course Coordinator**	Mrs.R.Arulmozhi										

		L	**T**	**P**	**C**
PH 0102	**MATERIALS SCIENCE**	**2**	**0**	**2**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to develop comprehension of the rapidly changing technological scenario and the requisite expertise for appropriate selection of materials for specific engineering applications.

INSTRUCTIONAL OBJECTIVES

At the end of the course, the student will be able to:

1. Understand electrical properties of materials,
2. Understand the properties and applications of semi conducting materials,
3. Understand general properties and applications of magnetic and dielectric materials,
4. Understand the behaviour of materials on exposure to light,
5. Understand general properties and application of modern engineering and bio materials, and
6. Get familiarized with the concepts of Nano Science and Technology.

UNIT 1 ELECTRONIC AND PHOTONIC MATERIALS **6**

Electronic materials: Importance of Classical and Quantum free electron theory of metals – Fermi energy and Fermi Dirac distribution function – Variation of Fermi level with temperature in intrinsic and extrinsic semiconductors – Hall effect – Dilute Magnetic Semiconductors (DMS) and their applications – High temperature Superconductivity. **Photonic materials:** LED and LCD materials – Photo conducting materials – Nonlinear optical materials (elementary ideas) and their applications.

UNIT 2 MAGNETIC, DIELECTRIC AND MODERN ENGINEERING MATERIALS **6**

Magnetic materials: Ferrites and garnets – Magnetic bubbles and their applications – Giant Magneto Resistance (GMR) – Colossal Magneto Resistance (CMR). **Dielectric materials:** Various polarization mechanisms in dielectrics (elementary ideas) and their frequency and temperature dependence – Dielectric loss – Piezo electric and ferro electric materials and their applications. **Modern engineering materials:** Shape memory alloys – Metallic glasses – Advanced ceramics and composites.

UNIT 3 BIO MATERIALS **6**

Classification of biomaterials – Comparison of properties of some common biomaterials – Effects of physiological fluid on the properties of biomaterials – Biological responses (extra and intra vascular system) – Metallic, Ceramic and Polymeric implant materials – Introduction to bio sensors and tissue engineering.

UNIT 4 NANO MATERIALS AND NANOTECHNOLOGY **6**

Basic concepts of Nano science and technology – Quantum wire – Quantum well – Quantum dot – Properties and technological advantages of Nano materials – Carbon Nanotubes and applications – Material processing by Sol – Gel method, Chemical Vapour deposition and Physical Vapour deposition – Microwave Synthesis of materials – Principles of SEM, TEM and AFM .

UNIT 5 MECHANICAL PROPERTIES OF MATERIALS **6**

Stress Strain diagram for different engineering materials – Engineering and true stress strain diagram – Ductile and brittle material – Tensile strength – Hardness – Impact strength – Fatigue – Creep – Fracture (Types and Ductile to brittle transition) – Factors affecting mechanical properties.

PRACTICALS **30**

1. Band gap determination using Post office box.
2. Dielectric constant measurement.
3. Photoconductivity measurement.
4. Resistivity determination for a semiconductor wafer using Four probe method.
5. Determination of Hall coefficient and carrier type for a semiconductor material.
6. To trace the hysteresis loop for a magnetic material.
7. Magnetic susceptibility – Quincke's method.
8. Determination of thermal conductivity – Lee's Disc method
9. Visit to Nano Technology Laboratory (optional)

TOTAL 60

TEXT BOOKS

1. S.O. Kasap, *Principles of Electronic Materials and Devices,* Tata McGraw Hill Edition, New Delhi, 2002.
2. Van Vlack, L.H., *Material Science for Engineers*, 6th edition, .Addision Wesley, 1985.
3. Thiruvadigal, J. D., Ponnusamy, S. and Vasuhi.P. S., *Materials Science*, 5th edition, Vibrant Publications, Chennai, 2007.

REFERENCE BOOKS

1. Rolf E. Hummel, *Electronic Properties of materials*, Narosa Publishing House, New Delhi, 1994.
2. Raghavan.V., *Materials Science & Engineering – A First Course*, 5th edition, Prentice Hall of India, New Delhi,2005.
3. Khanna. O. P., *A Text Book of Material Science & Metallurgy*, Revised edition, Dhanpat Rai Publications, New Delhi,2006.
4. Sujata V. Bhat, *Biomaterials*, 2nd edition, Narosa Publishing House, New Delhi, 2006.
5. Mick Wilson, Kamali Kannangara, Michells Simmons and Burkhard Raguse, *Nano Technology – Basic Science and Emerging Technologies*, 1st edition, Overseas Press,New Delhi,2005.

Course designed by		**Department of Physics**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
		×										
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
		X										
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	Dr.M.Alagiri										

		L	**T**	**P**	**C**
ME 0102	**ENGINEERING MECHANICS**	**3**	**2**	**0**	**4**
	Prerequisite				
	Nil				

(Vectorial approach may be preferred)

PURPOSE

To develop the ability to analyze any engineering problem in a simple logical manner and to solve basic problems in engineering mechanics.

INSTRUCTIONAL OBJECTIVES

At the end of this course the student should be able to understand

1. The vectorial and scalar representation of forces and moments
2. Static equilibrium of particles and rigid bodies
3. Principle of work and energy
4. Analysis of trusses, friction and their application
5. Dynamic equilibrium of particles and rigid bodies

UNIT I STATICS OF PARTICLES **9**

Equilibrium of Particle: Introduction – Laws of mechanics – Forces on particles – Concurrent forces in a plane – Coplanar forces – Resolution of forces – Resultant of several concurrent forces – Free body diagram – Equilibrium of particles in space. **Equilibrium of rigid bodies:** Principle of transmissibility – Moment of a force – Varignon's theorem – Equivalent system of forces – Reduction of system of forces into single force and couple-Types of loads-Types of supports and their reactions – Equilibrium of rigid bodies in two dimensions.

UNIT II ANALYSIS OF TRUSSES AND FRICTION **9**

Trusses: Plane Trusses – Simple Trusses –Analysis of Trusses – Method of joints, Method of sections.

Friction: Laws of Friction – Angle of Friction – Inclined plane – Wedges –Rolling friction – Belt Friction – Thrust and Journal bearings.

UNIT III PROPERTIES OF SURFACES AND VOLUMES 9

Centre of Gravity: Centroids of areas and volumes – Determination of centroids by integration – Theorem of Pappus-Guldinus. **Moment of Inertia:** Determination of moment of inertia of area by integration – Radius of gyration – Parallel and perpendicular axis theorems – Polar moment of inertia – Mass moment of inertia.

UNIT IV DYNAMICS OF PARTICLES 9

Rectilinear motion – Curvilinear motion – Motion of projectile – Relative motion – Newton's law-Principle of work and energy – Principle of impulse and momentum – Impulsive motion – Impact of elastic bodies – D'Alembert's principle.

UNITV DYNAMICS OF RIGID BODIES 9

Kinematics of rigid bodies – Translation and rotation of rigid bodies – Fixed axis rotation – General plane motion –Relative velocity in plane motion – Instantaneous center of rotation in plane motion – Principle of work and energy for a rigid body – Principle of impulse and momentum.

TUTORIAL 30
TOTAL 75

TEXT BOOKS

1. Beer, F. P., and Johnston, E. R., *Vector Mechanics for Engineers – Dynamics and Statics*, Tata McGraw-Hill, New Delhi, 2001.
2. Palanichamy, M. S., and Nagan, S., *Engineering Mechanics (Statics and Dynamics)*,Tata McGraw Hill, New Delhi 2001.
3. Kumar, K. L., *Engineering Mechanics*, Tata McGraw- Hill, New Delhi, 1998.

REFERENCE BOOKS

1. Timoshenko, and Young, *Engineering Mechanics*, Tata McGraw Hill Book Company, New Delhi, 1956.
2. Mclean, and Nelson, *Engineering Mechanics (Statics and Dynamics)*, 3rd Edition, Schaum Series, 1980.
3. Rajasekaran,S. and Sankarasubramanian,G., *Engineering Mechanics*, Vikas Publishing House Pvt Ltd, 2006.
4. Shames, I. H., and Krishna Mohana Rao, G., *Engineering Mechanics (Statics and Dynamics)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 2006.

Course designed by		**Department of Mechanical engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**F**	**g**	**h**	**i**	**j**	**K**
		×				×					×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART(E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Design**		**Manufacturing**			**Thermal**				**General**	
4	**Course Coordinator**	**Mr.R.Santhanakrishnan**										

		L	T	P	C
GE 0106	**BASIC ENGINEERING – II**	**4**	**0**	**0**	**4**
	Prerequisite				
	Nil				

PART A ELECTRICAL ENGINEERING

PURPOSE

This course provides comprehensive idea about circuit analysis, working principles of machines and common measuring instruments. It also provides fundamentals of electronic devices, transducers and integrated circuits.

INSTRUCTIONAL OBJECTIVES

1. At the end of the course students will be able
2. To understand the basic concepts of magnetic, AC & DC circuits.
3. To explain the working principle, construction, applications of DC & AC machines & measuring instruments.
4. To gain knowledge about the fundamentals of electric components, devices, transducers & integrated circuits.

UNIT 1 ELECTRICAL MACHINES **12**

Definition of mmf, flux and reluctance, leakage flux, fringing, magnetic materials and B-H relationship. Problems involving simple magnetic circuits.Faraday's laws, induced emfs and inductances, brief idea on Hysteresis and eddy currents. Working principle, construction and applications of DC machines and AC machines (1-phase transformers, 3-phase induction motors, single phase induction motors – split phase, capacitor start and capacitor start & run motors).

UNIT 2 AC & DC CIRCUITS **10**

Circuit parameters, Ohms law, Kirchhoff's law. Average and RMS values, concept of phasor representation. RLC series circuits and series resonance, RLC parallel circuits (includes simple problems in DC & AC circuits) Introduction to three phase systems – types of connections, relationship between line and phase values. (qualitative treatment only)

UNIT 3 WIRING & LIGHTING **8**

Types of wiring, wiring accessories, staircase & corridor wiring, Working and characteristics of incandescent, fluorescent, SV & MV lamps. Basic principles of earthing, simple layout of generation, transmission & distribution of power.

TOTAL 30

TEXT BOOKS

1. Muthusubramanian.R, Salivahanan.S, Muraleedharan.K.A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw - Hill ,1999.
2. Mehta V K ,Principles of Electronics S Chand & Co,1980

REFERENCE BOOKS

1. Kothari D P and Nagrath I J ,Basic Electrical Engineering , Tata McGraw Hill,1991
2. Mithal G K , Electronic Devices and Circuits, Khanna Publications,1997

PART B ELECTRONICS ENGINEERING

PURPOSE

This course provides comprehensive idea about circuit analysis, working principles of machines and common measuring instruments. It also provides all fundamentals of circuit components, electronic devices, transducers and integrated circuits.

OBJECTIVE

1. To understand the basic concept of magnetic, AC and DC circuits.
2. To explain the working principle, construction and applications of DC and AC machines.
3. To gain knowledge about the fundamentals of electric components, devices, transducers, measuring instruments and integrated circuits.

UNIT 1 ELECTRONIC COMPONENTS AND DEVICES **10**

Passive components – Resistors, Inductors and Capacitors and their types.

Semiconductor: Energy band diagram, Intrinsic and Extrinsic semiconductors, PN junction diodes and Zener diodes – characteristics.

Transistors: PNP and NPN transistors – theory of operation – Transistor configurations – characteristics – comparison.

Special semiconductor devices : FET – SCR – LED – V I characteristics – applications.

Rectifiers: Half wave and full wave rectifier – capacitive filter – wave forms – ripple factor – regulation characteristics.

UNIT 2 TRANSDUCERS AND MEASURING INSTRUMENTS **10**

Transducers: General features and classification of transducers, Resistive Transducers – Potentiometer, Unbonded strain gauge-Bonded strain gauge-Load cell, Inductive transducers – Differential output transducers – LVDT, Flow transducers, Temperature Transducers – Thermistors, Thermocouple and pyrometers.

Measuring Instruments: Basic principles and classification of instruments, Moving coil and moving iron instruments, CRO – Principle of operation.

UNIT 3 DIGITAL ELECTRONICS & LINEAR ICs **10**

Digital Fundamentals: Number systems – Boolean Theorems – DeMorgan's Theorem - Logic gates – Implementation of Boolean Expression using Gates.

Integrated Circuits: IC fabrication – Monolithic Technique, Function of Operational Amplifier.

TOTAL 30

TEXT BOOKS

1. Muthusubramanian.R, Salivahanan.S, Muraleedharan.K.A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw - Hill ,1999.
2. Metha V.K, "Principles of Electronics ",S. Chand & Co.,1980.
3. Kalsi H S, Electronics Instrumentation", ISTE publication,1995

REFERENCE BOOKS

1. Kothari D. P and Nagrath IJ, "Basic Electrical Engineering", Tata McGraw- Hill, 1991.
2. Thomas L.Floyd "Electronic devices", Addison Wesley Longman (Singapore) Pvt . Ltd., 5th Edition.

Course designed by		Department of Electrical & Electronics										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	K
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)		
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Mr.C.Bharathiraja & Mr.Mohanasundaram										

		L	T	P	C
PD0102	**PERSONALITY DEVELOPMENT - II**	**1**	**0**	**1**	**0**
	Prerequisite				
	Nil				

PURPOSE

To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES

1. To guide thought process
2. To groom students' attitude
3. To develop communication skill
4. To build confidence

SOFT SKILL – 2

UNIT – I

Interpersonal Skill and Team Work

UNIT – II

Leadership Skills

UNIT – III

Stress Management and Emotional Intelligence

UNIT – IV

Conflict Resolution

UNIT –V

Decision Making

TEXT BOOK

INSIGHT, Career Guidance Cell, SRM Publications Chennai, 2009.

REFERENCE

Convey Steven, Principle Centered Leadership, New York, Simon & Schuster, 1991.Lambert Jonamay & Mayers Selena, 50 Activities for conflict resolution.

PD0102 - PERSONALITY DEVELOPMENT - II												
Course designed by		Department of Career Development Centre										
1	Student outcomes	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
							x	**x**		**x**		
2	Category	General (G)			Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)	
		x										
3	Broad area (for 'P'category)	Electrical Machines			Circuits and Systems			Electronics			Power System	Intelligent Systems
4	Course Coordinator	Ms.G.Shobana										

		L	T	P	C
ME0122	**COMPUTER PROGRAMMING PRACTICE**	**1**	**0**	**2**	**2**
	Prerequisite				
	Nil				

PURPOSE

To provide hands-on training to the students in C – programming language and drafting exercises in Mechanical Engineering

INSTRUCTIONAL OBJECTIVES

To familiarise the students with C and C++ Programming.

LIST OF EXPERIMENTS

C AND C++ PROGRAMMING

1. Arrays, string manipulation
2. Matrix Manipulation – transpose, inverse, triangularisation
3. Functions and subroutines
4. Structures, user defined data type, enumeration
5. Records
6. File handling – opening, closing, creating, appending of unformatted data files – mark sheet processing
7. Sorting and searching

TOTAL 45

REFERENCE BOOKS

1. Balaguruswamy, E., *Programming in ANSI C*, Tata McGraw-Hill, New Delhi, 2004.
2. Goldfried, B. S., *Programming with C - Schaum outline series*, Tata McGraw-Hill Edition, 1998.
3. Laboratory Manual.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×						×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
		X										
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Mr.C.Subramanian**										

		L	T	P	C
ME0124	**ACTIVE LEARNING LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To make the students to understand some basic concepts using learning through discovery method.

INSTRUCTIONAL OBJECTIVES

To familiarise the students with basic concepts, theorems, etc.

LIST OF EXPERIMENTS

1. Lami's theorem.
2. Four bar mechanism.
3. Friction.
4. Fourier law of heat conduction.
5. Pneumatics circuits.

and others.

TOTAL 30

REFERENCE BOOKS

1. Laboratory Manual.

Course designed by		**Department of Mechanical Engineering**									
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×					×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
						X					
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**			
4	**Course Coordinator**	**Mr.D.Raja**									

SEMESTER III

		L	T	P	C
LE0201	**GERMAN LANGUAGE PHASE I**	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE
Enabling the Engineering Students to one more Foreign Language, especially German, which is scientific and technical language. This may be useful in the field of employment opportunities as well as helping them to develop projects on browsing German websites.

INSTRUCTIONAL OBJECTIVES
Developing pronunciation so that they can read the text and e-mail during their employment, instructing them to write their own C V and developing a fundamental conversation with any German national.

UNIT 1 INTRODUCTION **10**
German Language, Alphabets and Pronunciation.

THEMEN
Name, Land, Leute, Beruf, Familie geschwister, Einkaufen, Reisen, Zahlen, Haus, Freunden, Essen and Stadium, Fest, Zeit.

UNIT 2 LISTENING **10**
Listening to the cassette and pay special attention to the meaning and sounds. Listening Comprehension – Announcements / Airport / Station / General.

UNIT 3 READING **10**
Listening to the cassette and reading it allowed.
READING COMPRENSION BASICS / STATION / NEWS / NOTICE BOARDS.

TOTAL 30

GLOSSARY
Technical Words Lesson (1-5)

TEXT BOOK WITH CASSETTES

1. Grundkurs Deutsch
2. Momentmal (Max Mueller Bhavan – Goethe Institute, Germany).

SCHEME OF EVALUATION

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks
External 50 – 3 hours final written exam

Course designed by		Department of English and Foreign Languages										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
								×				
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)			PROFESSIONAL SUBJECTS (P)			
		X										
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Mrs. Barathi										

		L	T	P	C
LE0203	JAPANESE LANGUAGE PHASE I	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

1. In view of globalization, learning Foreign Language by Engineering graduates enhances their employment opportunities.
2. Get awareness of understanding of International culture.
3. Widening the Linguistic Skills of the Students.

INSTRUCTIONAL OBJECTIVES

To learn the scripts of Japanese Languages namely Hiragana, Katakana and Kanji, Vocabularies etc. To learn basic grammar and acquire basic communication skills. To understand Japanese culture.

UNIT 1 **8**

Alphabets (Hiragana), Self Introduction, Greetings, Classroom expressions, Numbers, Conversation.

UNIT 2 **8**

Alphabets Hiragana (continued),Vocabularies.

Counters .Time expression. Conversation

UNIT 3 **8**

Katakana and related vocabulary.
Kanjis –introduction. conversation.

UNIT 4 **6**

Lesson-1 Watashiwa Nihonjin desu. Grammar,Marume &Sentence pattern.Marume.
Conversation.

TOTAL **30**

TEXT BOOKS

1. Nihongo Shoho I main Text sold in India by the Japanese Language Teachers Association Pune.
2. Hiragana and Katakana Work Book published by AOTS Japan
3. Grammar and Kotoba (Work Book)
4. Japanese for Dummies.(Conversation) CD.

SCHEME OF EVALUATION

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks
External 50 – 3 hours final written exam

Course designed by		**Department of English and Foreign Languages**										
1	**Student Outcome**	**A**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
							×					
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
		×										
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**			**Thermal**		**Genaral**			
4	**Course Coordinator**	**Ms.R.Padmaja**										

		L	**T**	**P**	**C**
LE0205	**FRENCH LANGUAGE PHASE I**	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

1. As language skills are as valuable as technical skills a knowledge of French enables the engineering graduates in career orientation.
2. As a second international global Lang after English there is a wider choice of job opportunities in the inter national employment market and also multinationals in India and an understanding of French culture thro language.

INSTRUCTIONAL OBJECTIVE

Characterised by the Roman script, grammar, vocabulary and colloquial expressions are taught which enables them to communicate effectively with any native speaker.

UNIT 1 INTRODUCTION AND PRONUNCIATION **8**

Introduction of the French Language, Alphabets and Pronunciation, Greetings (Wishing, Thanking and Bidding good bye), Introducing oneself & someone Presenter quelqu'un et se presenter - conversational French sentences based on the topics discussed above.

UNIT 2 VOCABULARY **6**

Numbers and Dates, Days, Months and Seasons, Time, Nouns, Professions and Nationalities. C;onversational sentences on weather, time, and professions.

UNIT 3 GRAMMAR **5**

Basic Verbs (Avoir, Etre, Aller, Faire) – Conjugation – Present tense, Affirmative, Negative, Interrogative, Adjectives (Qualitative), Subject Pronouns and Disjunctive Pronouns.

UNIT 4 CONVERSATION AND LISTENING **6**

Conversational sentences on physical description and expressions with verbs like avoir, etre and faire

UNIT 5 GRAMMAR **5**

Prepositions (a, de,dans, en, sur,sous, pour….),Contracted Articles, Question Tag (Qui, Quel, Ou, ……etc)

TOTAL **30**

Text book:

1. Panorama – Goyal Publishers
2. Apprenons le Francais I, Sarawathy publication.

SCHEME OF EVALUATION

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks
External 50 – 3 hours final written exam

Course designed by		**Department of English and Foreign Languages**										
1	**Student Outcome**	**A**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
							×					
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
		X										
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Mr. V. Krishnamourthy**										

		L	**T**	**P**	**C**
MA0201	**MATHEMATICS – III**	**3**	**2**	**0**	**4**
	Prerequisite				
MA0101&MA0102A	Mathematics I & II				

UNIT 1 FOURIER SERIES **9**

Dirichlet's conditions – General Fourier series – Half range sine and cosine series–Parseval's identity – Harmonic analysis.

UNIT 2 PARTIAL DIFFERENTIAL EQUATIONS **9**

Formation – Solution of standard types of first order equations – Lagrange's equation – Linear Homogeneous partial differential equations of second and higher order with constant coefficients

UNIT 3 BOUNDARY VALUE PROBLEMS **9**

Classification of second order linear partial differential equations – Solutions of one-dimensional wave equation – one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates

UNIT 4 FOURIER TRANSFORMS **9**

Statement of Fourier integral theorem – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT 5 STATISTICS **9**

Review of measures of central tendency – measures of dispersion (no questions should be asked) – Moments – Skewness and kurtosis based on moments – Linear correlation and regression – Tests based on normal and t distribution for means and difference of means - χ^2 test for Goodness of fit.

TUTORIAL 30
TOTAL 75

TEXT BOOKS

1. Grewal, B, S., *Higher Engineering Mathematics, 36h edition*, Khanna Publishers, New Delhi, 2002.

REFERENCE BOOKS

1. Kreyszig, E., *Advanced Engineering Mathematics,* 8th edition, John Wiley & Sons, Singapore, 2000.
2. Miller, I,R. and Freund, J.E., *Probability and Statistics for Engineers*, Prentice Hall, 1995.
3. Kandasamy, P., etal., *Engineering Mathematics, Vol. II & Vol. III* (4th revised edition), S.Chand & Co., New Delhi, 2000.
4. Narayanan, S., Manickavachagom Pillay, T.,. and Ramanaiah,G., *Advanced Mathematics for Engineering students*, Volume II & III (2nd edition), S,Viswanathan Printers and Publishers, 1992.
5. Venkataraman, M,K., *Engineering Mathematics – Vol.III – A & B (13th edition)*, National Publishing Co., Chennai, 1998.

Course designed by		**Department of Mathematics**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	Dr.Babuji Pullepu										

		L	T	P	C
ME0201	**THERMODYNAMICS**	**2**	**2**	**0**	**3**
	Prerequisite				
	Nil				

(Use of approved Steam tables are permitted in the University Examinations)

PURPOSE

This course provides the basic knowledge about thermodynamic laws and relations, and their application to various processes.

INSTRUCTIONAL OBJECTIVES

Expected to

1. Understand the thermodynamic laws and their applications
2. Know the concept of entropy and availability
3. Know the thermodynamic relations
4. Have clear idea about the properties of steam and the use of steam tables and Mollier chart.

UNIT 1 BASIC CONCEPTS OF THERMODYNAMICS **6**

Macroscopic vs Microscopic aspects – Thermodynamic system and surrounding – Forms of energy– Properties of a system – State and equilibrium– Quasi static process– Zeroth law of Thermodynamics– Heat – Work – First law of Thermodynamics – Limitations – Application of First law to non– flow system– Thermodynamic analysis of control volume– Steady flow energy equation– Applications.

UNIT 2 SECOND LAW OF THERMODYNAMICS **6**

Kelvin-Planck statement – Clausius statement – Carnot cycle – Cyclic Heat engine – Heat Reservoirs – Refrigerator and Heat Pump – Equivalence of Kelvin – Planck and Clausius statements – Reversibility and Irreversibility.

UNIT 3 ENTROPY AND AVAILABILITY **6**

Clausius theorem – Clausius inequality – Entropy principle – Property diagrams involving entropy – Entropy change of Ideal gases – Entropy generation in a closed system – Entropy generation in an open system – Third law of Thermodynamics – Introduction to availability in non-flow and flow Process.

UNIT 4 THERMODYNAMIC RELATIONS **6**

Maxwell's equations – Clapeyron equation – General relations for dh,du,ds,C_p and C_v – Joule Thomson co-efficient.

Gas Mixtures – Dalton's law of partial pressures – P-v-T behaviour of gas mixtures– Property calculations.

UNIT 5 PROPERTIES OF STEAM **6**

Steam formation–Temperature Entropy diagram–Mollier diagram–Specific Properties of Steam–Use of steam tables & Mollier chart–Methods of Heating & Expanding the steam–Constant Volume Heating– Constant Pressure Expansion– Isothermal Expansion–Hyperbolic Expansion–Isentropic Expansion–Polytropic Expansion–Throttling process–Dryness fraction measurement.

TUTORIAL 30

TOTAL 45

TEXT BOOKS

1. Nag, P. K, *Engineering Thermodynamics*, 6 th Edition, Tata McGraw Hill, New Delhi, 1995.
2. Yunus, N. J., Cengel, A., and Michael Boles, A., *Thermodynamics– An Engineering Approach*, 2nd Edition, McGraw Hill India, 1994.

REFERENCE BOOKS

1. Michael Moran, J., and Howard Shapiro, N., *Fundamentals of Engineering Thermodynamics*, 4th Edition, John Wiley & Sons, New York, 2000.
2. Rayner Joel, *Basic Engineering Thermodynamics*, 5th Edition, Addison Wesley, New York, 1996.
3. Holman, J. P., *Thermodynamics*, 4th Edition Tata McGraw Hill, New Delhi, 1998.
4. Kothandaraman, C. P., and Domkundwar, S., *A Course in Thermal Engineering*, 5th Edition, Dhanpat Rai & Sons, New Delhi, 1998.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)		
						X						
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Dr.G.Kasiraman										

		L	T	P	C
IC0211	ELECTRONICS AND INSTRUMENTATION	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The aim of this course is to familiarize the student with the principle of operation, capabilities and limitation of Electronics and instrumentation so that he will be able to use this knowledge effectively.

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INSTRUTIONAL OBJECTIVES

1. To study the basics of Electronics
2. To study the Characteristics of Semiconductor action and Transistor.
3. To study the application of Semiconductor Devices like UJT, MOSFET, SCR, UJT.
4. To study the Basic of Measurement
5. To study the use of Primary sensing element and Signal Conditioning Unit.

UNIT 1 SEMICONDUCTOR DIODE **9**

Semiconductor diode – Crystal diode as a rectifier– Equivalent circuit of a Crystal Diode– Half Wave Rectifier– Efficiency of Half Wave Rectifier– Full wave Rectifier– Center tap Full Wave Rectifier– Full Wave Bridge Rectifier Efficiency of Full Wave Rectifier– Zener Diode– Equivalent Circuit of Zener Diode– Zener Diode as Voltage Stabilizer.

UNIT 2 TRANSISTOR & ITS BIASING **9**

Transistor Symbols – Transistor as an Amplifier– Connections– CB, CE,&CC– Characteristics– Comparison of Transistor Connection. Transistor as an Amplifier in CE arrangement– Transistors Load Line analysis, Operating Point– CE Circuit – Performance of Transistor Amplifier – Cut Off and Saturation points – Transistor biasing: Methods of transistor Biasing– Base resistor method– Biasing with feedback resistor– Voltage divider bias method .

UNIT 3 FET, SCR & UJT **9**

Types of Field Effect Transistor – JFET – Working Principles of JFET– JFET as an Amplifier and its Output Characteristics –JFET Applications– MOSFET Working Priniciples, SCR – Equivalent Circuit and V-I Characteristics. SCR as a Half wave and full wave rectifier– Application of SCR – Triac and Diac characteristics and its applications. UJT– Equivalent Circuit of a UJT and its Characteristics.

UNIT 4 MEASUREMENT SYSTEM **9**

Measurements and its Significance, Methods of Measurements, Classification of Instruments and application, Elements of a Generalized Measurement System, Static and Dynamic Characteristics of an Instruments, Errors in Measurement Systems– Units, System, Dimension and standards.

UNIT 5 PRIMARY SENSING ELEMENTS AND SIGNAL CONDITIONING **9**

Introduction– Transducers– Advantage of Electric Transducers, Classification Based upon Principle of Transduction, Primary and Secondary transducer, Passive and Active transducers, Analog and Digital transducers, Transducers and inverse transducers and examples for each. Characteristics and Choice of transducers, Input , Transfer and output Characteristics and its application. Operational Amplifier, Characteristics of Operational Amplifier, Attenuator, Amplitude Modulation and Demodulation, Basic Filters, A/D Converters. Simple Types

TOTAL **45**

TEXT BOOKS

1. Sawhney, A. K., *A Course in Electrical and Electronic Measurement and Instrumentation,* Dhanpat Rai & Sons, New Delhi,1999.
2. V.K, Mehta., and Rohit Metha, *Principles of Electronics*, S.chand & Company Ltd., First Edition, 1980.
3. Millman, and Halkias, *Electronic devices and Circuits*, Tata McGraw Hill International Edition, 1994.
4. Mithal, G. K., *Electronic Devices and Circuits*, Khanna Publishers, New Delhi, 1999.

REFERENCE BOOKS

1 Salivahanan, S., Sureshkumar, N., and Vallavaraj, A., *Electronic Devices and Circuits*, Tata McGraw-Hill, New Delhi, 1998.

2 Sze, S. M., *Semiconductor Devices – Physics and Technology*, 2nd Edtion, John Wiley & Sons, New York, 2002.

3 Ben G. Streetman and Sanjay Banerjee, *Solid State Electronic Devices*, Pearson Education, 2000.

4 Ernest O. Doebelin, *Measurement Systems – Application and Design,* Tata McGraw-Hill, New Delhi, 2004.

Course designed by		**Department of Electrical and Electronics**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
						X						
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Mr.V.S.Krushnasamy**										

		L	T	P	C
ME0203	**MANUFACTURING TECHNOLOGY**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To make the students aware of different manufacturing processes like metal forming, casting, metal cutting processes, gear manufacturing processes.

INSTRUCTIONAL OBJECTIVES

1. Study the various ways of working of metals
2. Concept of casting Technology
3. Concept of Machining with lathes and automats
4. Study of Milling machine and Gear manufacturing process
5. Various Surface finishing and Fine Finishing processes

UNIT 1 CASTING AND WELDING 9

Introduction to casting, Patterns, Types, Pattern materials, Allowances – Moulding – types– Moulding sand, Gating and Risering, Cores &Core making. Special Casting Process– Shell, Investment, Die casting, Centrifugal Casting.

Special welding– Laser, Electron Beam, Ultrasonic, Electro slag, Friction welding, Electrical resistance welding.

UNIT 2 MECHANICAL WORKING OF METALS 9

Hot and Cold Working: Rolling, Forging, Wire Drawing, Extrusion– types– Forward, backward and tube extrusion.

Sheet Metal Operations: Blanking– blank size calculation, draw ratio, drawing force, Piercing, Punching, Trimming, Stretch forming, Shearing, Bending– simple problems– Bending force calculation, Tube forming – Embossing and coining, Types of dies: Progressive, compound and combination dies.

UNIT 3 THEORY OF METAL CUTTING 9

Orthogonal and oblique cutting– Classification of cutting tools: single, multipoint – Tool signature for single point cutting tool – Mechanics of orthogonal cutting – Shear angle and its significance – Chip formation– Cutting tool materials– Tool wear and tool life – Machinability – Cutting Fluids– Simple problems.

UNIT 4 GEAR MANUFACTURING AND SURFACE FINISHING PROCESS 9

Gear manufacturing processes: Extrusion, Stamping, and Powder Metallurgy. Gear Machining: Forming. Gear generating process– Gear shaping, Gear hobbing.

Grinding process, various types of grinding machine, Grinding Wheel– types– Selection of Cutting speed and work speed, dressing and truing. Fine Finishing– Lapping, Buffing, Honing, and Super finishing.

UNIT 5 MACHINE TOOLS 9

Milling Machine – specification, Types, Types of cutters, operations, Indexing methods– simple problems. Shaping, Planning and Slotting Machine– description, Operations, Work and tool holding Devices. Boring machine– Specification, operations, Jig boring machine. Broaching machine– operations, Specification, Types, Tool nomenclature.

TOTAL 45

TEXT BOOKS

1. Sharma, P.C., *A textbook of Production Technology – Vol I and II*, S. Chand & Company Ltd., New Delhi, 1996.
2. Rao, P.N., *Manufacturing Technology*, *Vol I & II,* Tata McGraw Hill Publishing Co., New Delhi, 1998.

REFERENCE BOOKS

1. Chapman W. A. J., *Workshop Technology Vol. I and II*, Arnold Publisher, New Delhi, 1998.
2. Hajra Choudhary, S. K. and Hajra Choudhary, A. K., *Elements of Manufacturing Technology*, Vol II, Media Publishers, Bombay, 1988.
3. Jain. R. K., *Production Technology,* Khanna Publishers, New Delhi, 1988.
4. Kalpakjian, *Manufacturing Engineering and Technology,* Addision Wesley Congmen Pvt. Ltd., Singapore, 2000.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
		×		×								
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)					PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
		X										
4	Course Coordinator	Mr.V.G.Umasekar										

		L	T	P	C
ME0205	FLUID MECHANICS	3	2	0	4
	Prerequisite				
	Nil				

PURPOSE

To be familiar with all the basic concepts of fluids and fluid flow phenomenon, conservation equations and their applications to simple problems.

INSTRUCTIONAL OBJECTIVES

1. To familiarize with conservation laws and dimensional analysis to fluid flow problems
2. To familiarize flow through closed conduits and hydraulic machines

UNIT 1 FLUID PROPERTIES AND FUNDAMENTALS OF FLOW **9**

Brief history of fluid mechanics – Fluids and their properties – Continuum, density, viscosity, surface tension, compressibility and bulk modulus, concept of pressure. Fluid statics – Pascal's law, Hydrostatic law – Piezometric head – Manometry

UNIT 2 LAWS OF CONSERVATION **9**

System and Control volume concept, Lagrangian and Eulerian description of fluid flow – Steadiness and uniformity of flow – Acceleration of fluid flow – Stream lines, streak lines, path lines – Rotational and irrotational flow – One dimensional flow derivations – Euler's momentum equation – Linear and angular momentum – Bernoulli's equation – Application through various examples including flow measuring devices – Orifice meter, venturi meter.

UNIT 3 DIMENSIONAL ANALYSIS AND FLUID FLOW IN CLOSED CONDUICTS **9**

Dimensional Analysis –, Buckingham Pi – theorem, Derivations and applications of important dimensionless numbers, basic modeling and similitude.

Viscous fluid flow – Laminar and turbulent flow, Couette flow between parallel plates, Hegan– Poiseuille flow in circular pipes, Development of flow in pipes, Pipe friction, Darcy-Weissbach equation, Moody's chart, Pipe losses – Major and Minor losses – Problems of parallel, series and branched pipes.

UNIT 4 FLUID FLOW OVER BODIES **9**

Boundary layer theory – boundary layer development on a flat plate, displacement thickness, momentum thickness, momentum integral equation, drag on flat plate – Nature of turbulence, Separation of flow over bodies – streamlined and bluff bodies, Lift and Drag on cylinder and Aerofoil.

UNIT 5 HYDRAULIC MACHINES **9**

Classifications of Pumps– turbines – impulse, reaction turbines – velocity triangles – work done and efficiencies of Centrifugal pump, Pelton wheel, Francis and Kaplan turbines – Performance Comparison of Hydraulic turbines.

TUTORIAL 30
TOTAL 75

TEXT BOOK

1. Kumar, K.L., *Fluid Mechanics*, 2nd Edition, Tata McGraw-Hill, New Delhi, 2000.
2. Bansal, R. K., Text Book of Fluid Mechanics and Hydraulic Machines, Laxmi Publications Pvt. Ltd., New Delhi, 2006.

REFERENCE BOOKS

1. Douglas, J. F., Gasiorek and Swaffield, *Fluid Mechanics*, 3rd Edition, ELBS/ Pitman, U. K., 1995.
2. Potter, M.C. and Wiggert, D.C., *Mechanics of Fluids*, 2nd Edition, Prentice Hall, New Delhi, 1997.
3. Streeter, Victor, Bedford, K.W. and Wylie, E. Benjamin, *Fluid Mechanics*, 2nd Edition, Tata McGraw Hill, New Delhi, 1997.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
						X						
4	Course Coordinator	Mr.V.Rajasekar										

		L	T	P	C
PD 0201	PERSONALITY DEVELOPMENT - III	2	0	0	1
	Prerequisite				
	Nil				

PURPOSE

To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES

1. To improve verbal aptitude, vocabulary enhancement and reasoning ability of the student.
2. To help them qualify the written test of competitive exams, campus placements & PSUs.
2. To adopt new strategies in solving vocabulary section.

VERBAL APTITUDE

UNIT – I

Critical Reasoning

UNIT – II

Synonyms – Antonyms - Odd Word - Idioms & Phrases

UNIT – III

Word Analogy - Sentence Completion

UNIT – IV

Spotting Errors - Error Correction - Sentence Correction

UNIT – V

Sentence Anagram - Paragraph Anagram - Reading Comprehension

TEXT BOOK:

1. Personality Devolpment Verbal Book, Career Guidance Cell, SRM Publications Chennai, 2009

PD 0201 -PERSONALITY DEVELOPMENT - III

Course designed by						Department of Career Development Centre					
Student outcomes	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
						x	**x**		**x**	**x**	
Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)		
	x										
Broad area for "P" category	Electrical Machines		Circuits and Systems			Electronics			Power System		Intelligent Systems
Course Coordinator	Ms.M.S.Sarala										

		L	**T**	**P**	**C**
IC0217	**ELECTRONICS AND INSTRUMENTATION LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To study various Basic Circuits of Electronics and Measurements.

LIST OF EXPERIMENTS

1. Characteristics of Semiconductor Diode and Zener diode**.**
2. Characteristics of Transistor under Common Emitter Configuration.
3. Characteristics of Transistor Under Common Base Configuration.
4. Characteristics of Transistor Under Common Collector Configuration.
5. Characteristics of UJT and FET.
6. Characteristics of SCR, DIAC and TRIAC.
7. Characteristics of RTD.
8. Characteristics of Thermistor.
9. Characteristics of Thermocouple.
10. Strain Gauge and Load Cell Characteristics.

TOTAL 30

REFERENCE

1. Electronic Devices and Measurement Manual

Course designed by		Department of Instrumentation and control										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
		×	×			×						×
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)					PROFESSIONAL SUBJECTS (P)	
						X						
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Mr.V.S.Krushnasamy										

		L	T	P	C
ME0221	MANUFACTURING PROCESS LABORATORY	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

To expose hands-on training to the students on various machines like lathe, Shaper, Slotter, Milling, Gear hobbing, grinding machines.

INSTRUCTIONAL OBJECTIVES

1. Study of various types of lathe operations
2. To Produce flat surface and contour shapes on the given component
3. To know the various methods of making gears
4. To get an idea for making good quality products with good surface finish
5. Application oriented mini projects

LIST OF EXPERIMENTS

1. Introduction- lathe machine, plain turning, Step turning & grooving (Including lathe mechanisms, simple problems).
2. Taper turning-compound rest/offset method & Drilling using lathe (Including Drilling feed mechanism, Twist drill nomenclature, and Different types of taper turning operations).
3. External threading-Single start (Including Thread cutting mechanism-simple problems)
4. Eccentric turning-Single axis
5. Shaping-V-Block (Including Shaper quick return mechanism)
6. Grinding-Cylindrical /Surface/Tool & cutter
7. Slotting-Keyways (Including Broaching tool nomenclature and Slotter mechanism)
8. Milling-Polygon /Spur gear (Including Milling mechanism, simple problems)
9. Gear hobbing-Helical gear
10. Drilling, reaming, counter boring
11. Planning/Capstan lathe/Burnishing process (Planner Mechanism, Description of capstan and turret lathe)
12. Mini Project work- Application oriented products using above experiments.

Note: The following topics also should be covered during this practical course.

Super finishing, Metal spraying, Galvanizing, Electroplating, Anodizing.
Introduction to non-traditional machining process.

TOTAL 30

REFERENCE BOOKS

1. Chapman W. A. J., *Workshop Technology Vol. I and II*, Arnold Publisher, 1996.
2. Hajra Choudhary, S. K. and Hajra Choudhary, A. K., *Elements of Manufacturing Technology Vol II*, Media Publishers, 1986.
3. Laboratory Manual.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
		×	×									
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	**Mr.V.G.Umasekar**										

		L	**T**	**P**	**C**
ME0223	**FLUID DYNAMICS LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To enable the students to acquire knowledge of flow meters. Give student insight into working of various fluid machines and be able to compare performance of fluid machines under different working conditions

INSTRUCTIONAL OBJECTIVES

1. Gain knowledge on working of centrifugal pumps, positive displacement pumps, hydraulic turbines centrifugal blowers and steam turbines
2. Able to compare performance of various machines at different operating points
3. To gain the knowledge of various flow meters and the concept of fluid mechanics

LIST OF EXPERIMENTS

PART A – FLUID MECHANICS

1. Determination of coefficient of discharge of orifice meter
2. Determination of coefficient of discharge of venturi meter
3. Major losses in pipe flow
4. Verification of Bernoulli's theorem
5. Minor losses – expansion and contraction losses in pipes

PART B – HYDRAULIC MACHINES

1. Performance test on centrifugal pumps
2. Performance test on reciprocating pumps
3. Performance test on gear pumps
4. Performance test on deep well or submersible or jet pumps
5. Performance test on Pelton turbine or Francis turbine

PART C – FLUID MACHINES (working medium-air)

1. Performance test centrifugal blower with different impellers.
2. Performance test on reciprocating air compressor
3. Aerodynamic studies on isolated aerofoil in wind tunnel

TOTAL 30

REFERENCE

1. Laboratory manual

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	**Mr.R.Senthil**										

SEMESTER IV

		L	T	P	C
LE0202	**GERMAN LANGUAGE PHASE - II**	**2**	**0**	**0**	**2**
	Prerequisite				
	GERMAN LANGUAGE PHASE - I				

PURPOSE

Enabling the Engineering Students to one more Foreign Language, especially German, which is scientific and technical language. This may be useful in the field of employment opportunities as well as helping them to develop projects on browsing German websites.

INSTRUCTIONAL OBJECTIVES

Developing pronunciation so that they can read the text and e-mail during their employment, instructing them to write their own C V and developing a fundamental conversation with any German national.

UNIT 1 SPEAKING; 20

Dialogue – Questioning / Basic queries / Conversational with practical exposure.

UNIT 2 GRAMMATIK (WRITING) 10

Verben, Wortstellung, Nomen, Pronomen, Artikel, Nominitativ, Akkusativ, Dativ, Adjective, Prasens, Perfect and Neben Satze.

TOTAL 30

GLOSSARY

Technical words. Lesson (6-10)

TEXT BOOK WITH CASSETTES

A. Grundkurs Deutsch
B. Momentmal
(Prescribed by Max Mueller Bhavan – Goethe Institute, Germany).

SCHEME OF EVALUATION

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks
External 50 – 3 hours final written exam

Course designed by		**Department of English and Foreign Languages**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**K**
								×				
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
		x										
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Mrs. Barathi**										

		L	T	P	C
LE0204	**JAPANESE LANGUAGE PHASE II**	**2**	**0**	**0**	**2**
	Prerequisite				
	JAPANESE LANGUAGE PHASE I				

PURPOSE

1. In view of globalization, learning Foreign Language by Engineering graduates enhances their employment opportunities.
2. Get awareness of understanding of International culture.
3. Widening the Linguistic Skills of the Students.

INSTRUCTIONAL OBJECTIVES

To learn the scripts of Japanese Languages namely Hiragana, Katakana and Kanji, Vocabularies etc. To learn basic grammar and acquire basic communication skills. To understand Japanese culture.

OBJECTIVES

For beginners with no knowledge of Japanese to acquire basic communication skills.

UNIT 1 **8**

Lesson 2-{Korewa Tsukue desu } – Grammar, Sentence pattern, Marume .
Conversation

UNIT 2 **7**

Lesson 3 – [Kokoni denwa ga arimasu] - Grammar, Sentence pattern, Marume .Copnversation

UNIT 3 **9**

Lesson 4– {Asokoni hito ga imasu} - Grammar, Sentence pattern, Marume .
Lesson 5– {Akairingo wa ikutsu arimasu ka}-Grammar, Sentence pattern, Marume . Conversation.

Unit IV **6**

Lesson 6– {Barano hana wa ippon ikura desu ka}- Grammar, Sentence pattern.Marume.Conversation

TOTAL **30**

TEXT BOOKS

1. Nihongo Shoho Imain Text sold in India by the Japanese Language Teachers Association Pune.
2. Hiragana and Katakana Work Book published by AOTS Japan
3. Grammar and Kotoba (Work Book)
4. Japanese for Dummies.(Conversation) CD.

SCHEME OF EVALUATION

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks
External 50 – 3 hours final written exam

Course designed by		Department of English and Foreign Languages										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
								×				
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
		X										
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
4	Course Coordinator	Ms.R.Padmaja										

		L	T	P	C
LE0206	FRENCH LANGUAGE PHASE II	2	0	0	2
	Prerequisite				
	FRENCH LANGUAGE PHASE I				

PURPOSE

1. As language skills are as valuable as technical skills a knowledge of French enables the engineering graduates in career orientation.
2. As a second international global Lang after English there is a wider choice of job opportunities in the inter national employment market and also multinationals in India and an understanding of French culture thro language.

INSTRUCTIONAL OBJECTIVE

Characterised by the Roman script, grammar, vocabulary and colloquial expressions are taught which enables them to communicate effectively with any native speaker.

UNIT 1 **6**

Sports (Ski, natation, tennis, Tour de France), Cuisine (French dishes),Cinema
(Review of a film) – Articles on these topics and group discussion will be followed.

UNIT 2 GRAMMAR **6**

Possessive Adjectives, Demonstrative Adjectives, Past tense – Passé Compose(Verbe Auxiliare:.Etre et Avoir)

UNIT 3 **6**

Culture and Civilization French Monuments (Tres celebres), French History (Jeanne d' Arc, Louis XIV, Prise de la Bastille), Culture and Civilisation (vin, fromage, mode, parfums)

UNIT 4 **6**

Transport system, government and media in France – articles on these topics.

UNIT 5 **6**

Comprehension and Grammar Comprehension passages and conversational sentences in different situations (at the restaurant, at the super market)

TOTAL **30**

TEXT BOOK:

1. Panorama – Goyal Publishers
2. Apprenons le Francais II, Sarawathy Publications

SCHEME OF EVALUATION

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks
External 50 – 3 hours final written exam

Course designed by		**Department of English and Foreign Languages**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
								×				
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
		X										
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Mr. V. Krishnamourthy**										

		L	**T**	**P**	**C**
MA0202	**NUMERICAL METHODS**	**3**	**2**	**0**	**4**
	Prerequisite				
	Mathematics I & II				

(Students are encouraged to use MATLAB®)

PURPOSE

To familiarize the students in various numerical techniques and its applications in Engineering.

INSTRUCTIONAL OBJECTIVES

On completion of this course the student is expected to understand and solve

1. the system of linear and non-linear equations
2. Differential equations

UNIT 1 SYSTEM OF LINEAR EQUATIONS **9**

Computer architecture, number representations, recursion. Error – sources, propagation and estimation. Condition numbers, stability analysis.

Cramer's rule, Gaussian elimination, pivoting, LU factorization, Error analysis, Tri-diagonal systems, Special matrices – Sparse, banded. Iterative methods, convergence of iterative schemes.

Engineering applications.

UNIT 2 NON LINEAR SYSTEMS **9**

Bisection, Newton-Raphson iteration. Interpolation of functions by polynomials – Lagrange interpolation, Hermite, piece-wise polynomial interpolation, Trigonometric interpolation. Triangular family. Engineering applications – spring mass systems, statically determinate truss.

UNIT 3 NUMERICAL DIFFERENTIATION AND INTEGRATION **9**

Integration formulas – Trapezoidal, Simpson, unequal segments and open integration formulas. Integration of equations – Newton-Cotes, Gauss Quadrature. Engineering applications
Differentiation formulas, Richardson extrapolation, derivatives of unequally spaced data.

UNIT 4 DIFFERENTIAL EQUATIONS **9**

Ordinary differential equations: Euler, Runga-Kutta Methods, Prdictor-corrector methods. Boundary Value problems, Eigen value problems. Engineering applications.
Partial Differential Equations: Elliptic equations, parabolic equations. Engineering applications.

UNIT 5 CURVE FITTING AND NUMERICAL OPTIMISATION **9**

Curve fitting: Least-squares line, curve fitting, interpolation by spline functions, Fourier approximation
Numerical Optimisation: Golden search, Fibonacci search, Quadratic interpolative search, Nelder Mead method, Powells method, Steepest descent, Gradient search, Newton's search method. Engineering application – Analysis of experimental data, design problems.

TUTORIAL 30
TOTAL 45

TEXTBOOKS

1. Mathews, J. H., and Fink, K. D., *Numerical Methods using MATLAB®*, 4th edition, PHI, 2005.
2. Chopra S. C. and Canale R. P., *Numerical methods for Engineers*, 4th edition, Tata McGraw Hill, New Delhi, 2002.

REFERNCE

1. Buchanan J. I. and Turner P. R., *Numerical Methods and Analysis*, McGraw Hill International, 1992.

Course designed by		**Department of Mathematics**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Ms.N.Subashini**										

		L	**T**	**P**	**C**
ME0204	**MECHANICS OF SOLIDS**	**3**	**2**	**0**	**4**
	Prerequisite				
	Nil				

(Use of approved design data book is permitted)

PURPOSE

To familiarize the students with the fundamentals of deformation, stresses, strains in structural elements.

INSTRUCTIONAL OBJECTIVES

Students will be able to

1. Know the concepts of stress and strain
2. Analyze the beam of different cross sections for shear force, bending moment, slope and deflection
3. Understand the concepts necessary to design the structural elements and pressure vessels.

UNIT 1 CONCEPT OF STRESSES AND STRAINS **10**

Concept of stress and strain, Hooke's law – Tension, Compression, and Shear, stress-strain diagram – Poisson's ratio, elastic constants and their relationship – Deformation of simple and compound bars – Thermal stresses. Principal plane, principal stress, maximum shearing stress – Uniaxial, biaxial state of stress – Mohr's circle for plane stresses.

UNIT 2 ANALYSIS OF BEAMS **9**

Beams: Types and Transverse loadings – shear force and bending moment diagrams for cantilevers, simply supported and over hanging beams. **Theory of pure bending**: Bending stresses in simple and composite beams. Shear stress distribution in beams of different sections.

UNIT 3 TORSION OF SHAFTS AND SPRINGS **9**

Theory of pure torsion, torsion of circular shafts, simple problems – Type of springs, stiffness, springs in series, springs in parallel, stresses and deflections in helical springs and leaf springs – Design of helical springs and leaf springs.

UNIT 4 DEFLECTION OF BEAMS **9**

Slope and deflection of cantilever, simply supported, fixed beam by double integration method – Macauley's method – Moment area method – Strain energy method – Castigliano's theorem.

UNIT 5 COLUMN AND STRUTS **8**

Member subjected to combined bending and axial loads, Euler's theory, Crippling load, Rankine's theory.
Cylinders And Shells : Thin cylinder, thin spherical shells under internal pressure – Thick cylinders – Lame's equation – Shrink fit and compound cylinders.

TUTORIAL **30**
TOTAL **75**

TEXT BOOKS

1. Bansal,R.K., *A Text Book of Strength of Materials*, Lakshmi Publications Pvt. Limited, New Delhi, 1996.
2. Prabhu,T.J., *Design of machine elements*, Private Publication, 1999.
3. Ferdinand P.Beer, and Rusell Johnston, E., *Mechanics of Materials*, SI Metric Edition, McGraw Hill, 1992.

REFERENCE BOOKS

1. William A. Nash, *Theory and Problems of Strength of Materials,* Schaum's Outline Series, McGraw Hill International Edition, 3rd Edition, 1994.
2. Srinath, L. S., *Advanced Mechanics of Solids*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1987.
3. Popov, E. P., *Mechanics of Materials*, 2nd edition, Prentice Hall of India Private Limited, New Delhi, 1989.
4. James M. Gere, *Mechanics of Materials* Fifth Edition, Brooks/Cole, USA, 2001.
5. Shigley, J. E., *Applied Mechanics of Materials*, International Student Edition, McGraw Hill Koyakusha Limited, 2000.
6. Maitra, *Handbook of Machine Design*, Tata McGraw Hill, New Delhi, 1986.
7. *Design Data,* PSG College of Technology, 2000.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	K
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
				X								
4	Course Coordinator	Mr.R.Harris Samuel										

		L	T	P	C
ME0206	APPLIED THERMAL ENGINEERING	3	2	0	4
	Prerequisite				
	Nil				

PURPOSE

On completion of this course, the students are exposed to understand the concept and working of gas, vapour power cycles, air compressors, refrigeration and air conditioning systems.

INSTRUCTIONAL OBJECTIVES

1. To study air/vapour cycles with reheat and regeneration
2. Performance study of compressors are introduced
3. Knowledge of eco-friendly refrigerants, refrigeration and air conditioning systems

UNIT 1 GAS POWER CYCLES **9**

Air standard cycles – Assumptions – Otto, Diesel, Dual-air standard efficiency – mean effective pressure and power; Brayton cycle – reheat and regeneration. (Elementary treatment only)

UNIT 2 VAPOUR POWER CYCLES **9**

Rankine cycle – performance – simple, reheat and regenerative cycle – Introduction to Binary vapour cycle (Elementary treatment only)

UNIT 3 AIR COMPRESSORS **9**

Reciprocating air compressors – types – construction – work of compression without clearance – effect of clearance – multistage – optimum intermediate pressure for perfect intercooling – compressor efficiencies and mean effective pressure.

Rotary compressors – Vane compressor, Roots blower (construction and working only)

UNIT 4 REFRIGERATION SYSTEMS **9**

Types of refrigeration systems – vapour compression and vapour absorption systems – working principle, refrigerants – properties. Eco friendly refrigerants.

Analysis of vapour compression refrigeration cycle, use of P-h chart, effect of sub cooling and superheating – calculations of COP (ammonia, R134a, R12 and R22 only)

UNIT 5 PSYCHROMETRY AND AIR CONDITIONING **9**

Properties of atmospheric air – psychrometric chart, psychrometric processes: Sensible heating and cooling, Cooling and dehumidification – Heating and humidification.

Description of summer, winter and year round air conditioning system, description of window and split air conditioning system, Cooling load calculations – simple problems only.

TUTORIAL 30
TOTAL 75

TEXT BOOKS

1. Rajput, R. K., *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2006.
2. Domkundwar, A., *A Course in Thermal Engineering*, Dhanpat Rai & Co., New Delhi, 2000.

REFERENCE BOOKS

1. Sarkar, B. K., *Thermal Engineering*, 3rd Edition, Tata McGraw Hill, New Delhi, 2006.
2. Arora, S. C., Domkundwar, C. S., *A course in Refrigeration and Air Conditioning*, 4th Edition, New Age International (p) Ltd., New Delhi, 2002.
3. Eastop, T.D., Mcconkey, A., Applied Thermodynamics for Engineering Technologists, 5th Edition, Pearson Edition Publications, 2002.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	**Dr.G.Kasiraman**										

		L	**T**	**P**	**C**
ME0208	**MACHINES AND MECHANISMS**	**3**	**2**	**0**	**4**
	Prerequisite				
	Nil				

PURPOSE

To expose the students to learn the fundamentals of various laws governing rigid bodies and its motions.

INSTRUCTIONAL OBJECTIVES

1. Basic mechanisms, velocity and acceleration of simple mechanisms
2. Drawing the profile of cams and its analysis
3. Friction applications, gear train calculations
4. Balancing of machines.

UNIT 1 MECHANISMS **11**

Introduction – Links – Pairs – Chain – Mechanism – Machine structure – Degrees of freedom – Four bar chains – Terminology and definition – Planer, Spherical and Spatial Mechanisms – Grashoff's law – Kutzback criterion – Grubler's criterion for plane mechanism. Inversion of mechanisms – Four bar, single slider crank and double slider crank mechanisms – Simple problems – Instantaneous centre – Kennedy's theorem. Velocity and Acceleration of Four bar and single slider crank mechanisms by relative velocity Method.

UNIT 2 ADVANCED MECHANISMS AND CAMS **10**

Pantograph – Steering gear mechanism – Davis Steering gear – Ackerman steering gear – Hooke's joint – Double Hooke's joint.

CAMS: Types of cams and followers – Follower motion – Uniform, SHM and cycloidal. Cam terminology – Cam profiles construction for roller, flat faced and knife edge follower types – pressure angle.

UNIT 3 FRICTION **6**

Friction: Applications – Screw friction – Effort calculations –Efficiency– Self locking and overhauling of screws. Friction clutches – disc, cone clutches – Working principle – Torque, Power transmitted derivations and calculations.

UNIT 4 GEAR TRAINS AND CONTROL MECHANISMS **9**

Spur gear terminology and definition – Gear trains: simple, compound, reverted and epicyclic – Velocity ratio and torque calculation in gear trains – Automobile differential.

Gyroscopes: Gyroscopic forces and couple – Forces on bearing due to gyroscopic action – Gyroscopic effect in ship, motor cycle, car and aircraft. **Concept of governors:** (elementary treatment only)

UNIT 5 TURNING MOMENT DIAGRAM AND BALANCING **9**

Turning moment diagrams: Fly wheels – Application of flywheel – Punching presses.

Static and dynamic Balancing: Balancing of rotating masses – Balancing of single cylinder engine – Balancing of multi cylinder engine – Balancing machines.

TUTORIAL **30**
TOTAL **75**

TEXT BOOKS

1. Ratan, S.S., *Theory of Machines*, Tata McGraw Hill Publishing company Ltd., 2 nd Edition ,2005
2. Thomas Bevan, *Theory of Machines*, CBS Publishers and Distributors, 3rd Edition, 1984.

REFERENCE BOOKS

1. Shigley, J. E., and Uicker, J. J., *Theory of Machines and Mechanisms,* McGraw Hill, 1995.
2. Ghosh, A., and Mallick, A. K., *Theory of Mechanisms and Machines*, Affiliated East-West Pvt Ltd., New Delhi, 1988.
3. Rao, J. S., and Dukkipati, R.V., *Mechanism and Machine Theory*, Wiley–Eastern Ltd., New Delhi, 1995.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
				X								
4	Course Coordinator	Mr.S.Balamurugan										

		L	T	P	C
ME0210	COMPUTER AIDED DESIGN AND ANALYSIS	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To study how computer can be applied in mechanical engineering design.

INSTRUCTIONAL OBJECTIVES

To familiarize with

1. Concepts of modeling in 2D and 3D.
2. Concepts of computer graphics.
3. CAD Packages and its features.
4. Theory of analysis and its implementation in CAD.

UNIT 1 INTRODUCTION **9**

Introduction to Design process - CAD**. Geometric Modeling:** Types – Wireframe, surface and solid modeling. **Solid modeling techniques:** CSG and B-rep – Operations: Boolean – Extrude - Sweep - Revolve. Entities – Line – Circle – Ellipse – Parabola - Cubic Spline, Bezier and B-spline (Basic treatment only).

UNIT 2 GRAPHICS CONCEPTS (2D and 3D) **9**

Coordinate systems – Transformations: translation, scaling, reflection, rotation - Concatenated transformation - Inverse transformation. Hidden line removal - Shading - Colouring - Rendering – Animation (Basic treatment only).

UNIT 3 SOFTWARE PACKAGES AND RECENT TECHNOLOGY **6**

Commercial solid modeling packages: Salient features - Technical comparison - Modules and tools - Brief outline of data exchange standards. Brief outline of feature technology: Classification of features - Design by features - Applications of features - Advantages and limitations.

UNIT 4 FEM FUNDAMENTALS **12**

Introduction – Steps involved in FEA: Nodes - Elements and their types, shape function, constraints, forces and nodal displacements - Stiffness matrix - Solution techniques. Analysis of spring element. Simple problems involving stepped bar subject to axial loading and simple structural members with triangular element.

UNIT 5 ANALYSIS **9**

FEA in CAD Environment: Stages of FEA in CAD environment – Preprocessor - Solver and postprocessor. Demonstration of the above using any one commercial packages. Brief outline of kinematic analysis - Manufacturability analysis and simulation (Basic treatment only).

TOTAL 45

TEXTBOOKS

1. Ibrahim Zeid, *CAD / CAM – Theory and Practice*, Tata Mcgraw-Hill, New Delhi, 2001.
2. Radhakrishnan. P., *CAD / CAM / CIM* - New age international, 2000.
3. Chairs Mcmahon and Jimmie Browne, *CAD/CAM*, Addision Wesly, New York, 2000.

REFERENCE BOOKS

1. Chandupatla and Belagundu, *Introduction to Finite Element Methods in Engineering*, Prentice Hall of India Private Limited, New Delhi, 1997.
2. Newman and Sproull R. F., *Principles of interactive computer graphics*, Tata Mcgraw-Hill, New Delhi,1997.
3. Mikell P. Groover, *CAD/CAM*, Prentice Hall of India Private Limited, New Delhi, 1997.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	**Mr.V.Magesh**										

		L	**T**	**P**	**C**
PD 0202	**PERSONALITY DEVELOPMENT - IV**	**2**	**0**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE

To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES

1. To improve aptitude, problem solving skills and reasoning ability of the student.
2. To help them qualify the written test of competitive exams, campus placements & PSUs.
3. To collectively solve problems in teams & group.
4. To adopt new techniques in solving problem.

QUANTITATIVE APTITUDE - 1

UNIT – I
Numbers - Averages

UNIT – II
Simple Interest & Compound Interest - Word Problems

UNIT – III
Permutation and Combination - Probability

UNIT – IV
Reasoning (Analytical) - Reasoning (Logical)

UNIT – V
Clocks - Calender

REFERENCE BOOKS

1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata Mcgraw Hill, 3rd Edition
2. Edgar Thrope, Test Of Reasoning for Competitive Examinations, Tata Mcgraw Hill, 4th Edition
3. http://fw.freshersworld.com/placementweek/papers.asp

PD 0202 -PERSONALITY DEVELOPMENT - IV												
Course designed by		Department of Career Development Centre										
1	Student outcomes	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
					x					**x**	**x**	
2	Category	General (G)			Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)	
		x										
3	Broad area (for 'P'category)	Electrical Machines			Circuits and Systems			Electronics			Power System	Intelligent Systems
4	Course Coordinator	Mr.K.Harikumar										

		L	T	P	C
ME0222	**STRENGTH OF MATERIALS LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE
To familiarize the students with the use of stress, strain measuring instruments.

INSTRUCTIONAL OBJECTIVES
1. The students will be able to understand procedures for conducting tensile, torsion tests on mild steel specimens.
2. Determine the Young's modulus using deflection test on beams and tensile test on rods, tension and compression test on springs, bricks, concrete, and impact tests on steel.

LIST OF EXPERIMENTS

1. Tensile test on mild steel rod.
2. Torsion test on mild steel rod.
3. Deflection test on steel and aluminium specimen.
4. Charpy and Izod impact test on steel specimen.
5. Double shear test on steel rod.
6. Compression test on brick and concrete blocks.

7. Tension and compression test on helical springs.
8. Brinell and Rockwell hardness test.

Total 30

REFERENCE BOOKS

1. Kazimi, S. M. A., *Solid Mechanics*, First Revised Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 1994.
2. Laboratory Manual

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×						×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**			**PROFESSIONAL SUBJECTS (P)**			
									X			
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	**Mr.A.Vinoth**										

		L	**T**	**P**	**C**
ME0224	**COMPUTER AIDED DESIGN LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To provide hands-on training to the students on various software in mechanical engineering

INSTRUCTIONAL OBJECTIVES

To familiarise with

1. Drafting practice using computer
2. Modeling of 2D and 3D parts
3. Assembly of modeled parts
4. Analysis of modeled parts

UNIT 1 COMPUTER AIDED DRAFTING OF MACHINE ELEMENTS 6

Orthographic views - Isometric views - Sectional views. Dimensioning - Annotations - Symbols - Welding- Surface finish - Threads. Text - Bill of Materials- Title block.

Exercise: Knuckle, Gib and Cotter Joint - Screw Jack - Foot step bearing.

UNIT 2 GEOMETRIC MODELING OF MACHINE COMPONENTS 6

Protrusion- cut – Sweep – Revolve - Draft and loft - Modify/edit – Pattern – Transformation - Boolean operation.

Exercise: Individual parts of Universal Joint - Flange Coupling - Piston and Connecting rod.

UNIT 3 CONVERSION OF 3D TO 2D 6

Conversion of 3D to 2D and Mass property calculations for parts created in Units I and II.

UNIT 4 ASSEMBLY OF MACHINE PARTS **6**

Exercise: Assemble from parts created in Unit II.

UNIT 5 FINITE ELEMENT ANALYSIS **6**

FEA of simple structural members - Cantilever beam - Simply supported beam and a plate with a hole.

TOTAL 30

REFERENCE

Laboratory Manual.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**			**PROFESSIONAL SUBJECTS (P)**			
									X			
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	Mr.V.Magesh										

		L	**T**	**P**	**C**
ME0226	**MANUFACTURING AND ASSEMBLY DRAWING**	**1**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

To enable the engineering students to draw a detailed production and assembly drawing for given components

INSTRUCTIONAL OBJECTIVES

At the end of this course the student should be able to understand

1. Indian codes and standards for engineering drawing
2. Representation of Fits and Tolerances in technical drawing
3. Assembly drawing of machine elements
4. Production drawing of components

UNIT 1 TECHNICAL DRAWING STANDARDS **2**

Indian Standard Code of practice for Engineering Drawing: General principles of presentation, conventional representation of dimensioning and sectioning, conventional representation of threaded parts, gears, springs and common features. Abbreviations and symbols used in technical drawings. Symbols and method of indication on the drawing for surface finish, welding and riveted joints.

UNIT 2 FITS AND TOLERANCES **3**

Tolerance types and representation on the drawing – Fits types and selection for different applications – Basic hole systems - Basic shaft systems – Allowances. Geometric tolerances – Form and positional. Datum and datum features symbols used to represent geometric tolerances.

UNIT 3 ASSEMBLY DRAWING OF JOINTS, COUPLING AND BEARINGS **4**

Preparation of drawing for keys and keyways, cotter joints, pin joints and screwed fasteners. Preparation of drawing for Couplings - Flange coupling and universal coupling, Bearings: Plummer block - Foot step bearing. Representation of tolerances in drawing.

UNIT 4 PRODUCTION DRAWING **2**

Preparation of production drawing for simple components, interpretation of production drawings.

UNIT 5 ASSEMBLY DRAWING OF MACHINE ELEMENTS **4**

Preparation of assembled views given parts details - Lathe tail stock - Lathe chuck - Connecting rod - Screw jack, Machine vice, Tool head of shaper and Stop valve. Representation of tolerances in drawing.

PRACTICAL 45
TOTAL 60

NOTE:

Examination must include an assembly drawing of machine elements.

TEXT BOOKS

1. Gopalakrishnan, K.R., *Machine Drawing,* Subash Publishers, Bangalore, 2000.
2. Narayana, K.L., Kanniah, P. and Venkata Reddy, K., *Production Drawing*, New Age International, New Delhi, 2002.

REFERENCES

1. Sidheswar Kannaiah, N., Sastry, P.V.V.V., *Machine Drawing,* Tata McGraw Hill, New Delhi, 1997.
2. Bhatt, N. D., *Machine Drawing,* Charotar publishing house, Anand, 1999.
3. Junnarkar, N. D., *Machine Drawing*, First Indian print, Pearson Education (Singapore) Pvt. Ltd., 2005.
4. *P.S.G. Design Data Book,* Coimbatore, 2001.
5. Revised IS codes: 10711, 10712, 10713, 10714, 9609, 1165, 10715, 10716, 10717, 11663, 11668, 10968, 11669, 8043, 8000.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
								×				×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Mr.M.Sermaraj										

SEMESTER V

		L	T	P	C
ME0301	**FUNDAMENTALS OF VIBRATION AND NOISE**	**3**	**2**	**0**	**4**
	Prerequisite				
	Nil				

PURPOSE

To familiarize the students with the sources of vibration and noise in machines and make design modifications to reduce the vibration and noise and improve the life of the components

INSTRUCTIONAL OBJECTIVES

Students will be able to

1. Know the concepts of vibration and noise
2. Analyze the Single Degree, Two Degree and Multi degree of Freedom Systems
3. Understand the case studies on the field of Vibration
4. Identify the sources of noises and the ways to control it.

UNIT 1 SIMPLIFICATION OF VIBRATION PROBLEMS TO ONE DEGREE OF FREEEDOM 9

Basic equation of motion for various vibration problems – Torsional, Free damped and Forced vibration problems, critical speed, nature of exciting forces, vibration isolation, vibration instruments.

UNIT 2 TWO AND MULTI-DEGREE OF FREEDOM SYSTEMS 9

Two degree – Formulation of solution - Coupling between rotating and translation - Applications.
Multi degree – Governing equation for close coupled systems - Lateral vibration, Geared systems - Effect of gyroscopic acceleration.

UNIT 3 SOLUTION OF VIBRATION PROBLEMS 9

Approximate methods (or) Numerical methods – Holzer's method, Myklestadt's method, Sturn sequence
Energy methods – Rayleigh's Approach – Close coupled systems. For coupled systems – Dunkerley's method, Rayleigh Ritz method.

UNIT 4 DIAGNOSTICS AND FIELD MEASUREMENT 9

Diagnostic tools - Condition monitoring in real time - Balancing of rotors - Field measurements on various compressors, fans, machine foundation.

UNIT 5 MACHINERY NOISE AND CONTROL 9

Basics of noise - Introduction, amplitude, frequency, wavelength and sound - Pressure level, noise dose level - Measurement and analysis of noise. Methods for control of noise - Mechanical noise - Predictive analysis, Sound in enclosures - Sound energy absorption - Sound transmission through barriers.

TUTORIALS 30
TOTAL 75

TEXT BOOK

1. Ramamurti, V., *Mechanical Vibration Practice with Basic Theory*, 1st edition, Narosa Publishing House, Chennai, 2000.
2. Kewel Pujara., *Vibration and noise for engineers*, Dhanpat rai & Sons, 1992.

REFERENCES

1. Rao, J. S. and Gupta, K., *Introductory course on theory and practice of mechanical vibrations,* Wiley Eastern, New Delhi, 1984.
2. Rao, S. S., *Mechanical vibrations*, 3rd Edition, Addison Wesley publishing company, New York, 1995.
3. Thomson, W. T., *Theory of Vibration and its Applications*, Prentice Hall, New Delhi, 1982.
4. Meirovitch, L., *Elements of Vibration Analysis*, Mc Graw-Hill Book Co., New York,, 1986.
5. Keith Mobley, R., *Vibration Fundamentals*, Plant Engineering Maintenance Series, Elsevier, 2007.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
				X								
4	Course Coordinator	Mr.M.Kamaraj										

		L	T	P	C
ME0303	MECHANICAL ENGINEERING DESIGN	3	2	0	4
	Prerequisite				
	Nil				

(Use of approved data book permitted)

PURPOSE

To study the basic design principles and apply the principles to the design of various elements encountered in Mechanical machines and structures.

INSTRUCTIONAL OBJECTIVES

On completion of this course the student is expected

1. To design simple joints, fasteners, levers and springs.
2. To determine the strength of the components
3. To determine the failure conditions and apply them to real life problems

UNIT 1 FUNDAMENTALS OF MECHANICAL DESIGN **9**

Basic Definitions - Phases of Design - Types of Loads. Types of stresses: Normal, shear, and combined stresses. Criteria for Design: strength, contact fatigue, stiffness, wear resistance, vibration resistance, heat resistance, reliability. Brief outline of engineering materials and theories of failure. Exhaustive problem solving in Basic Design with members subjected to simple stresses and combined stresses under uniform loading.

UNIT 2 DESIGN OF JOINTS (without eccentric loading) **9**

Design of cotter joints and knuckle joints. Design of bolted joints. Design of riveted joints, welded joints and its application to pressure vessels.

UNIT 3 PARTS SUBJECTED TO ECCENTRIC LOADING **9**

Eccentric loading on rivets and bolts. Eccentric loading on welds. Curved beams – crane hook - Frames, clamps.

UNIT 4 DESIGN OF LEVERS AND SPRINGS **9**

Design of levers - Design of springs - Helical and leaf springs.

UNIT 5 OTHER TYPES OF LOADING **9**

Members subjected to variable stresses. Failure and endurance limit - Factors affecting endurance limit. Stress concentration - Methods of reducing stress concentration - Notch sensitivity.

Combined steady and Variable stresses - Soderberg, Gerber and Goodman methods for combination of stresses and their application in design problems. Members subjected to impact loads and dynamic loads.

Design Project: (Not for Examination) Real life problems in Mechanical Engineering.

TUTORIAL 30
TOTA L 75

TEXT BOOK

1. Prabhu, T. J., *Design of machine elements*, Kasthuri Publication, Chennai, 2003.
2. Patel, R. C., Sikh, S. S. and Pandya, *Machine Design*, Volume I, C. Jamdan & Co., 1999.

REFERENCE BOOKS

1. Norton, R. L., *Design of Machinery*, McGraw Hill, 1999.
2. Robert C. Juvinall, *Fundamentals of Machine Component Design*, John Wiley & sons, 3rd Edition, 2002.
3. Spots, M. F., *Design of Machine Elements*, Prentice Hall of India Private Limited, New Delhi, 1983.
4. William Orthwein, *Machine Component Design*, Vol. I and II, Jaico Publising House, Chennai, 1996.
5. Maitra, *Handbook of Gear Design*, Tata Mcgraw-Hill, New Delhi, 1986.
6. *Design Data,* PSG College of Technology, Coimbatore, 2006.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×					×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	Mr.R.Harris Samuel										

		L	**T**	**P**	**C**
ME0305	**HEAT AND MASS TRANSFER**	**3**	**2**	**0**	**4**
	Prerequisite				
	Nil				

PURPOSE

This course provides the necessary background for an engineer to under take the thermal design and analysis of different types of heat exchange equipment

INSTRUCTIONAL OBJECTIVES

To familiarize the students with

1. Conduction, convection and radiation heat transfer.
2. Applications of heat transfer in Heat exchangers, insulations etc.
3. Mass Transfer.

UNIT 1 CONDUCTION **9**

Fourier's Law of Conduction – General equation in Cartesian, cylindrical and spherical co-ordinates - One dimensional steady state conduction in plane wall, composite wall, composite cylinder, composite sphere with convection boundaries - Conduction with heat generation - Thermal contact resistance - Overall heat transfer coefficients - Critical thickness of insulation.

UNIT 2 CONDUCTION II **9**

Fins or Extended surfaces: Pin fins, annular fins, longitudinal fins - Unsteady state conduction - Lumped heat capacity system - Biot number, Fourier number - Semi infinite, infinite solids – Multi - Dimensional systems, Conduction shape factor - Numerical solutions of two dimensional steady and unsteady state conduction.

UNIT 3 CONVECTION **9**

Hydrodynamic and thermal boundary layer: Principles and governing equations - Dimensional analysis of free and forced convection heat transfer.

Forced convection: External flow over a flat plate, cylinder, sphere and non-circular ducts, Internal flow through pipe, annular spaces and non-circular conduits. **Natural convection**: vertical, horizontal, inclined surfaces. **Heat exchangers**: Types, fouling factor, log mean temperature difference and number of transfer units method – Simple problems on double pipe heat exchanger.

UNIT 4 RADIATION **9**

Electromagnetic spectrum - Black body emission, emissive power, laws of radiation - Nature, black, grey bodies, concepts, radiation shape factor - Thermal resistance and electrical analogy - Radiation heat transfer between two surfaces - Reradiating surface - Radiation shield - Solar radiation - Radiation properties of gases and vapors.

UNIT 5 HEAT TRANSFER WITH PHASE CHANGE AND MASS TRANSFER **9**

Film wise and drop wise condensation. Film wise condensation outside vertical and horizontal tubes. Boiling heat transfer, regimes of boiling - Nucleate boiling, film boiling - Peak heat flux. Fick's law of diffusion, Equimolal counter diffusion, Stefan's law, Evaporation in atmosphere- problem, Non-dimensional numbers in mass transfer - Mass transfer coefficients - Forced convective mass transfer - Introduction to Energy conservation.

TUTORIAL **30**
TOTAL **75**

TEXT BOOKS

1. Sachdeva, R.C., *Fundamentals of Heat and Mass Transfer*, 2nd Edition, New Age International (P) Ltd., New Delhi,1998.
2. Kothadaraman, C. P., *Fundamentals of Heat and Mass Transfer*, 4th Edition, New Age International (P) Ltd., New Delhi, 1998.

REFERENCE BOOKS

1. Franker, P. and David, P., *Introduction to Heat Transfer,* 4th edition, John Wiley, New York, 2002.
2. Holman, J. P., *Heat Transfer*, 4th Edition, McGraw Hill book Company, New York, 1989.
3. Nag, P.K., *Heat Transfer and Mass Transfer*, Tata McGraw Hill, 2nd Edition, New Delhi, 2006.
4. Ozisik. M., *Heat Transfer*, McGraw Hill book Company, New York, 1998.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
		×				×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
						X						
4	Course Coordinator	Mr.P.Chandrasekaran										

		L	T	P	C
ME0307	MATERIALS TECHNOLOGY	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

On completion of the course the student will have knowledge about the technology of different materials and their applications.

INSTRUCTIONAL OBJECTIVES

This course will enable the students to know more about

1. Different materials with their properties,
2. Various production techniques and applications,
3. Fracture analysis for different metals,
4. Strengthening mechanisms and
5. Applications of metallic and non metallic materials.

UNIT 1 ELASTIC AND PLASTIC BEHAVIOUR **9**

Elasticity in metals and polymers – Mechanism of plastic deformation – Role of yield stress, shear strength of perfect and real crystals – Strengthening mechanisms, work hardening - Solid solutioning, grain boundary strengthening, particle, fibre and dispersion strengthening - Effect of temperature, strain and strain rate on plastic behaviour – Super plasticity – Deformation of non-crystalline material.

UNIT 2 FRACTURE BEHAVIOUR **9**

Griffith's theory, stress intensity factor and fracture toughness – Ductile to brittle transition – High temperature fracture, creep – Deformation mechanism maps – Fatigue, Low and high cycle fatigue test crack initiation and propagation mechanisms - Fracture of Non-metallic materials – Failure analysis, Sources of failure, procedure of failure analysis.

UNIT 3 PHASE DIAGRAMS **8**

Introduction - Solid solutions - Intermediate phases – Phase rules – Free energy in intermediate phases – Phase diagrams – Phase changes in alloys – Determination of phase diagrams - Ternary phase diagrams – Cooling curves – Equilibrium diagrams of Iron and Iron –Carbide diagram – Definition of structures.

UNIT 4 MODERN METALLIC MATERIALS **9**

Dual phase alloys - Micro alloyed steels, High Strength Low alloy (HSLA) steel - Transformation induced plasticity (TRIP) steel, Maraging steel – Intermettalics, Ni and Ti aluminides – Smart materials - Shape memory alloys – Metallic glasses – Quasi crystals and nano crystalline materials.

UNIT 5 NON METALLIC MATERIALS **10**

Polymeric materials – Formation of polymer structure – Production techniques of fibre, foams, adhesives and coating – structure and properties and applications of engineering polymers – Advanced structure ceramics, WC, TIC, Al_2O_3, O_2, SiC, SI_2N_4, CBN and Diamond – Properties, processing and applications.

Composite materials: Types, production techniques, structure, properties and applications.

TOTAL 45

TEXT BOOKS

1. Dieter, G. E., *Mechanical Metallurgy*, McGraw Hill, Singapore, 2001.
2. Thomas H. Courtney, *Mechanical Behaviour of Engineering materials*, McGraw Hill, Singapore, 2000.

REFERENCE BOOKS

1. Flinn, R. A. and Trojan, P. K., *Engineering Materials and their applications*, Jaico, Bombay, 1989.
2. Budinski K.G. and Budinski, M. K., *Engineering Materials Properties and selection*, Prentice Hall of India Private Limited, New Delhi, 2004.
3. ASM Metals Hand book, *Failure analysis and prevention,* Vol: 10, 14th edition, New York, 2002.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×										
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Mrs.R.Ambigai										

		L	T	P	C
PD0301	**PERSONALITY DEVELOPMENT – V**	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE
To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES
At the end of course the students will be able to:
1. Improve aptitude, problem solving skills and reasoning ability of the student.
2. Help them qualify the written test of competitive exams, campus placements & PSUs.
3. Collectively solve problems in teams & group.
4. Adopt new techniques in solving problem.

QUANTITATIVE APTITUDE - 2

UNIT – I
Percentage - Profit Loss Discount

UNIT – II
Ratio, Proportion - Mixtures & Solutions

UNIT – III
Time & Work - Time, Speed & Distance

UNIT – IV
Set Theory - Geometry & Mensuration - Cubes

UNIT – V
Data Sufficiency - Data Interpretation - Reasoning (Logical & Analytical) - ii

REFERENCE:

1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata Mcgraw Hill, 3rd Edition
2. Edgar Thrope, Test Of Reasoning For Competitive Examinations, Tata Mcgraw Hill, 4th Edition
3. http://fw.freshersworld.com/placementweek/papers.asp

PD0301 - PERSONALITY DEVELOPMENT – V												
Course designed by	Department of Career Development Centre											
Student outcomes	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	
				x					**x**	**x**		
Category	General (G)		Basic Sciences (B)				Engineering Sciences and Technical Arts(E)				Professional Subjects(P)	
	x											
Broad area for "P" Category	Electrical Machines		Circuits and Systems				Electronics				Power System	Intelligent systems
Course Coordinator	Mr.R.Kumaravel											

		L	T	P	C
ME0321	**MACHINE DYNAMICS LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To study the static and dynamic behaviour of machines.

INSTRUCTIONAL OBJECTIVES

Students will be able to

1. Understand and use various measurement methods
2. Understand and verify the laws governing the dynamics of machines
3. Understand the case studies on the field of Vibration

LIST OF EXPERIMENTS

1. Measurement of amplitude, velocity and acceleration using vibration pick-ups.
2. Measurement of strain.
3. Measurement of cutting forces using Drill, Lathe and Milling Dynamometers.
4. Determination of moment of inertia of systems.
5. Study of gear parameters
6. Kinematics of gear trains – simple, compound, epicyclic, differential.
7. CAM Analysis – angle Vs displacement and jump phenomenon.
8. Governors - determination of characteristics and sensitivity.
9. Vibration analysis of mechanical systems.
10. Tensional vibration rotor systems.
11. Balancing of rotating masses.
12. Whirling of shaft.
13. Diagnostics and field measurement of vibrations.
14. Gyroscope.

TOTAL 30

REFERENCE

Laboratory Manual

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	Mr.K.R.Arun Prasad										

		L	T	P	C
ME0323	**HEAT POWER LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

This laboratory course is intended to give the students, experimental knowledge on the performance and operations of I.C. Engines and steam generators

INSTRUCTIONAL OBJECTIVES

To impart knowledge about

1. Testing the engines, lubricants and fuels used for IC engines.
2. Using various dynamometers used for testing IC engines,
3. Operating boilers and conducting performance test on boilers.

LIST OF EXPERIMENTS

IC ENGINES AND FUEL

1. Valve and port timing diagrams on four and two stroke engines.
2. Performance test on twin-cylinder diesel engine with electrical dynamometer.
3. Performance test on single cylinder high speed diesel engine with rope brake dynamometer
4. Performance test on single cylinder slow speed diesel engine with belt brake dynamometer.
5. Retardation test to find frictional power of a diesel engine.
6. Heat balance test on four stroke diesel engine.
7. Determination of viscosity- Redwood and Saybolt viscometers.
8. Determination of flash point and fire point

STEAM

1. Performance and energy balance test on steam generator.

TOTAL 30

REFERENCE BOOKS

Laboratory Manual

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Mr.P.Chandrasekaran										

		L	T	P	C
ME0325	**MATERIALS TECHNOLOGY LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To acquire the knowledge of identifying the metals and understanding the metallurgical concepts.

INSTRUCTIONAL OBJECTIVES

The course will help the student to

1. prepare different metal specimen for identification.
2. Study the microstructure of metals.
3. Understand the treatment procedures.
4. Become familiar with SEM and TEM typical microstructures.

LIST OF EXPERIMENTS

1. Specimen preparation for metallographic examination.
2. Study of metallurgical microscope, different types and their operations.
3. Microstructural study of different materials such as Plain carbon, high carbon steels, quenched and tempered steel, Stainless steel, S.G. Iron, Malleable iron, Grey CI, White CI, Al, Brass, Bronze, Cold worked and recrystallised specimens
4. Microstructural study of steel weldment.
5. Study of Hardness values before and after heat treatment.
6. Hardenability test using Jominey end test apparatus.
7. Grain size measurement by comparison with ASTM Charts.
8. Wear analysis using Pin-on-Disc machine and Dry Abrasion tester.
9. Study of a typical SEM and TEM microstructures.

TOTAL 30

REFERENCE

Laboratory Manual

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×								×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Mrs.R.Ambigai										

		L	T	P	C
ME0327	**COMPREHENSION I**	**0**	**2**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE

The students will be vigorously tested on the understanding of all the concepts in engineering that they have learnt so far in the Mechanical Engineering programme. This will enable the students to gain the confidence and competence to solve real life engineering problems.

IMPLEMENTATION

Class room exercises, group discussions, case studies and topics on how the things work are assigned to students on an individual basis and evaluation done by a panel of teachers. The students are required to take-up an end semester examination and obtain a minimum mark for gaining the required credit.

TOTAL 30

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
								×				
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	**Mr.V.Magesh**										

		L	T	P	C
ME0329	**INDUSTRIAL TRAINING - I**	**0**	**2**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE

To expose the students to the industry working environment.

IMPLEMENTATION

A minimum of 2 weeks in-plant training has to be undergone by the student during winter / summer vacation following III / IV semester. A certificate from the company to the effect that he has undergone the training successfully has to be produced. The student is required to present a report on the observations and knowledge gained during the training which will be evaluated by a panel of faculty members.

TOTAL 15

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	B	c	d	e	f	g	h	i	j	k
		×		×	×			×				
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
								X				
4	Course Coordinator	Mr.M.Sermaraj										

		L	T	P	C
ME0331	COMPUTER SKILL	0	0	4	2
	Prerequisite				
	Nil				

PURPOSE

To acquire extramural knowledge on the computer implementation of various engineering solutions.

IMPLEMENTATION

The students are expected to undergo at least two computer courses from a list of courses provided from time to time by all the departments of engineering and technology. Resources for conducting the courses will be found from in-house talents and outside professionals with expertise in the particular course. Certification will be done by both the university and the bodies drafted for the purpose.

TOTAL 60

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		×										×
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
								X				
4	Course Coordinator	Mr. K. R. Arun Prasad										

SEMESTER VI

		L	T	P	C
ME0302	**GAS DYNAMICS AND TURBOMACHINERY**	**3**	**2**	**0**	**4**
	Prerequisite				
	Thermodynamics and Fluid mechanics				

PURPOSE

On completion of this course - the students will be in a position to apply their knowledge to solve problems in basic compressible flow, and all fluid machines working under the same principle. Only flow aspects of these Machines are considered and mechanical and material aspects are not included.

INSTRUCTIONAL OBJECTIVES

The course aims at analysis of

1. Flow through nozzle and diffuser with and without shock.
2. Flow through contact area duct using friction and heat transfer.
3. Design calculations of all types of turbines and their operations are covered.

UNIT 1 FUNDAMENTALS OF COMPRESSIBLE FLOW AND FLOW THROUGH VARIABLE AREA DUCTS 9

Energy equation for compressible fluid flow, various regimes of flow, reference velocities stagnation states, velocity of sound derivation, critical states, Mach number, Crocco number, critical Mach number, types of waves, Mach cone, Mach angle, effect of Mach number on compressibility, equivalent of Bernoulli's equation for compressible flow.

Isentropic flow through variable area ducts, T-S and h-s diagrams for nozzles and diffusers, area ratio as a function of Mach number, impulse function (no derivation), mass flow rate through nozzles and diffusers, non-dimensional mass flow rate in terms of pressure ratio (Flienger's formula).

UNIT 2 FLOW WITH NORMAL SHOCK 9

Development of shock wave, governing equations, variation of flow parameters like static pressure, static temperature, density, stagnation pressure and entropy across the shock (no derivations), Prandtl - Meyer equation, impossibility of shock in subsonic flows, strength of a shock wave, flow through nozzles and diffusers with shock, normal shock in Fanno and Rayleigh flows, (elementary treatment only).

UNIT 3 FLOW THROUGH CONSTANT AREA DUCTS 9

Flow in constant area ducts with friction (Fanno flow), Fanno curves and Fanno flow equations, variation of flow properties (no derivation), variation of Mach number with duct length. Flow in constant area duct with heat transfer (Rayleigh flow), Rayleigh curves and Rayleigh flow equations, variation of flow properties (no derivation), maximum heat transfer.

UNIT 4 PRINCIPLES OF TURBOMACHINERY 9

Classification - specific work - representation of specific work in T-s and h-s diagrams – internal and external loses – Euler's equation of turbo Machinery – ideal and actual velocity triangles – slip and its estimation – impulses and reaction type Machines – degree of reaction – effect of outlet blade angles on blade shape – model laws, specific speed and shape number – special features of hydro, steam and gas turbines – performance characteristics of turbo Machines – cavitation, surge and stall – thin aerofoil theory.

UNIT 5 STUDY OF TURBOMACHINES 9

Compressors – Axial and centrifugal type, Axial flow Turbines – Velocity triangles, performance (Elementary treatment only).

TUTORIAL 30
TOTAL 75

TEXT BOOKS

1. Yahya, S. M., *Fundamentals of Compressible Flow with Aircraft and Rocket Propulsion*, Wiley Eastern, New Delhi, 1993.
2. Yahya, S. M., *Turbines, Fans and Compressors*, Tata McGraw Hill Publications, New Delhi, 1996.

REFERENCE BOOKS

1. Shapiro, A. H., *The Dynamics and Thermodynamics of Compressible Fluid flow - (Vol I and II)*, Ronald Press, New York, 1953.
2. Gopalakrishnan, G. and Prithvi Raj, D., *Treatise on Turbo Machines*, Scitech Publications, Chennai, 2002.
3. Dixon, S. L., *Fluid Mechanics and Thermodynamics of Turbo Machinery*, Pergomen Publications, 1998.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**F**	**g**	**h**	**i**	**j**	**k**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Mr.P.Chandrasekaran										

		L	**T**	**P**	**C**
ME0304	**ELEMENTS OF MECHATRONICS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To present the concept and components of mechatronics systems in a structured way.

INSTRUCTIONAL OBJECTIVES

To Study

1. Combination of mechanical, electrical, electronics and information engineering
2. The understanding ability of microelectronics to reduce the demand on mechanical systems
3. To have cognizance of performance of commonly used sensors and actuation system
4. The PLC and design application

UNIT 1 INTRODUCTION **9**

Introduction to Mechatronics systems, Mechatronics system components - Measurement Systems, Control Systems, Open and Closed Loops Systems, Sequential Controllers with examples – Water level controller, Shaft speed control, Washing machine control, Automatic camera and Engine management systems.

UNIT 2 MICROPROCESSOR IN MECHATRONICS **10**

Development of microprocessor systems, 8085 – Architecture, Pin diagram, Input and Output peripheral circuits, communications – Input, Output and Memory with timing diagrams, A/D and D/A convertors. Introduction to design and recent developments in microprocessors and controllers.

UNIT 3 ELECTRICAL DRIVES AND CONTROLLERS **9**

Introduction, Electromagnetic Principles, Solenoids and Relays, Electrical drives - stepper motors, servo motors. Programmable logic controller - Programming units - Memory - Input - Output Modules - Mnemonics - Timers

- Internal relays - Counters - Shift Registers - Programming the PLC using Ladder diagram - Simple example of PLC application.

UNIT 4 SENSORS AND TRANSDUCERS **9**

Resistive, capacitive and inductive transducers, Electric Position Sensors, Limit Switches, Optical encoders – Absolute and Incremental, Proximity Sensors, Solid State Sensors and Transducers, Temperature and pressure sensors.

UNIT 5 MECHATRONICS SYSTEM DESIGN AND APPLICATION **8**

Mechatronics in Engineering Design, Traditional and mechatronics design, Applications – Pick and Place robots, Car park barriers, Bar code reader, Wind screen wiper wing stepper motor control. Case studies – Coin counters, Robot walking machine.

TOTAL 45

TEXT BOOKS

1. Bolton, W., *Mechatronics*, Addison Wesley, 2nd Edition, New Delhi, 1999.
2. Bradley, D.A., Dawson D., Dawson, D. Burd N.C.and Loader A.J.,*Mechatronics*, Chapman and Hall Publications, New York, 1993.
3. Galop Visoy, A., and Devries, W.R., *Microcomputer Applications in Manufacturing*, John Wiley, New York, 1989.

REFERENCE BOOKS

1. James Harter, *Electromechanics, Principles and Concepts and Devices*, Prentice Hall, New Delhi.
2. David W. Pessen, *Industrial Automation Circuit Design and Components*, John Wiley, New York, 1990.
3. Rohner, P., *Automation with Programmable Logic Controllers*, Macmillan / McGraw Hill, New York, 1996.
4. Brian Morris, *Automatic Manufacturing Systems Actuators*, *Controls and Sensors*, McGraw Hill, New York, 1994.
5. Goankar, R. S., *Microprocessor Architecture Programming and Applications*, Wiley Eastern, New Delhi, 1997.
6. Godfrey C. Onwuvolu, *Mechatronics Principles and applications*, Butterworth-Heinemann, New Delhi, 2006.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	Mrs.R.Ambigai										

		L	T	P	C
ME0306	**FLUID POWER CONTROL**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To expose the learner to the fundamentals of hydraulic and pneumatic power control and their circuits with industrial applications

INSTRUCTIONAL OBJECTIVES

To familiarize the students with

1. The fundamentals of fluid power
2. Principles and characteristics of the fluid power components
3. Circuit building and interpretation
4. Logic controls and trouble shooting

UNIT 1 HYDRAULIC SYSTEMS **9**

Introduction to fluid power system - Hydraulic fluids - functions, types, properties, selection and application. Construction, operation, characteristics and graphical symbols of hydraulic components – pumps, actuators/motors, valves, switches, filters, seals, fittings and other accessories.

UNIT 2 PNEUMATIC SYSTEMS **9**

Introduction, comparison with hydraulic systems and electrical systems. Construction, operation, characteristics and symbols of pneumatic components. Air treatment – principles and components. Sensors – types, characteristics and applications. Introduction to fluidics and MPL.

UNIT 3 HYDRAULIC / PNEUMATIC CIRCUITS **10**

Reciprocating circuits, pressure dependant circuits, speed control circuits, pilot operated circuits, simple sequencing circuits, synchronizing circuits, circuits using accumulator, time delay circuits, logic circuits, cascading circuits, feedback control circuits.

UNIT 4 DESIGN OF FLUID POWER SYSTEMS **9**

Speed, force and time calculations, Calculation of pressure and pressure drop across components, size of actuators, pumps, reservoirs and accumulators. Calculations of Heat generation in fluids.

UNIT 5 APPLICATION, MAINTENANCE AND TROUBLE SHOOTING **8**

Development of hydraulic / pneumatic circuits applied to machine tools, presses, material handling systems, automotive systems, packaging industries, manufacturing automation. Maintenance in fluid power systems – preventive and breakdown. Maintenance procedures. Trouble shooting of fluid power systems – fault finding process, equipments / tools used, causes and remedies. Safety aspects involved.

TOTAL **45**

TEXT BOOKS

1. Anthony Esposito, *Fluid Power with applications*, Prentice Hall international, 1997.
2. Majumdar S.R., *Oil Hydraulics*, Tata McGRaw Hill, 2002.
3. Majumdar S.R., *Pneumatic systems – principles and maintenance*, Tata Mcgraw-Hill, New Delhi, 1995.

REFERENCE BOOKS

1. Werner Deppert / Kurt Stoll, *Pneumatic Application*, Vogel verlag, 1986.
2. John Pippenger, Tyler Hicks, *Industrial Hydraulics*, McGraw Hill International Edition, 1980.
3. Andrew Parr, *Hydraulics and pneumatics*, Jaico Publishing House, 2003.
4. FESTO, *Fundamentals of Pneumatics*, Vol I, II and III.
5. Hehn Anton, H., *Fluid Power Trouble Shooting,* Marcel Dekker Inc., NewYork, 1984.
6. Thomson, *Introduction to Fluid power,* Prentcie Hall, 2004.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	C	d	e	f	g	h	i	j	k
				×		×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
		X										
4	Course Coordinator	Mr.R.Murugesan										

		L	T	P	C
ME0308	OPERATIONS RESEARCH	2	2	0	3
	Prerequisite				
	Nil				

PURPOSE

To enlighten the students with the various optimization techniques

INSTRUCTIONAL OBJECTIVES

At the end of the course the students will be able to know

1. Concepts of Linear programming technique
2. Applications and use of Assignment, Transportation and Replacement models
3. Techniques of PERT, CPM
4. Detailed knowledge of Inventory control and queing theory
5. Decision theory and game theory techniques.

UNIT 1 LINEAR PROGRAMMING **6**

Operations research and decision making - Types of mathematical models and constructing the model - Formulation of linear programming problem - Simplex method (Analytical & Graphical) - Two phase and Big M methods.

UNIT 2 ASSIGNMENT AND TRANSPORTATION MODELS **6**

Assignment models - Transportation problem – North west corner method – Least cost method – Vogel's approximation method – Modi method, Unbalance and degeneracy in transportation model - Replacement model – Replacement of items that deteriorate, gradually, fail suddenly, group replacement policy analysis.

UNIT 3 SCHEDULING AND NETWORK ANALYSIS **6**

Problem of sequencing – Processing 'n' jobs through two machines and three machines - Processing two jobs through 'm' machines. Network analysis – PERT and CPM, Total slack, free slack, Probability of achieving completion date - Cost analysis

UNIT 4 INVENTORY CONTROL AND QUEING THEORY **6**

Variables in an inventory problem - Inventory models with penalty - Storage quantity discount, Safety stock - Inventory models with probability - Demand, Multi item deterministic model.

Queing Theory : Poisson arrivals and exponential service times - Waiting time and idle time cost - Single channel, multi channel problem, Monte Carlo technique applied to Queing problems - Poisson arrivals and Service time.

UNIT 5 DECISION THEORY AND GAME THEORY **6**

Steps in decision theory approach – Decision making conditions – Decision trees – Decisions under uncertainity conditions.

Game Theory: Optimal solution of two person zero sum games mixed strategies, graphical solution of (2xn) and (mx2) games – solution of (mxn) games by linear programming.

TUTORIAL **30**

TOTAL **60**

TEXT BOOKS

1. Handy, A. Taha, *Operations Research*, 5th Edition, Prentice Hall of India, New Delhi, 1995.
2. Philip and Ravindran, "Operational Research ", John Wiley, 1992.

REFERENCE BOOKS

1. Premkumar, Gupta and Hira, *Operation Research*, S. Chand & Co., New Delhi, 1986.
2. Fredric S. Hilleer and Gerold J. Lieberman, *Introduction to Operation Research*, 2nd Edition, CBS, 1974.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×			×			
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	**Mr. Oliver nesa raj**										

		L	**T**	**P**	**C**
PD0302	**PERSONALITY DEVELOPMENT VI**	**1**	**0**	**1**	**2**
	Prerequisite				
	Nil				

PURPOSE

To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES

At the end of course the students will be able to:

4. Understand the importance of verbal communication in the workplace
5. Understand the significance of oral presentations, and when they may be used.

6. Practice verbal communication by making a technical presentation to the class
7. Understand the fundamental of listening and how one can present in a group discussion
8. Prepare or update resume according to the tips presented in class.

COMMUNICATION SKILLS

UNIT – I
Self Introduction

UNIT – II
Tech talk / Area of Interest / Extempore

UNIT – III
Curriculum Vitae

UNIT – IV
Mock Interview

UNIT – V
Group Discussion / Case Study

REFERENCE BOOKS

1. M. Ashraf Rizvi, Effective Technical Communication, Tata MC.Graw Hill, 2005
2. S P Dhanavel, English and Communication Skills for students of Science and Engineering, Orient Black swan, 2009.

PD0302 -PERSONALITY DEVELOPMENT VI											
Course designed by	Department of Career Development Centre										
Student outcomes	**a**	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				x		**x**	**x**		**x**		
Category	General (G)	Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)				
	x										
Broad area for "P" Category	Electrical machines	Circuit and systems				Electronics	Power Systems		Intelligent systems		
Staff responsible for preparing the Syllabus	Ms. T. Mythili										

		L	**T**	**P**	**C**
ME0322	**AUTOMATION LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE
1. To train the students in hydraulic and pneumatic circuit design.
2. To train the students in handling different control devices.

INSTRUCTIONAL OBJECTIVES
To practice the students in
1. Design of Hydraulic and Pneumatic circuits for low cost automation
2. Control of stepper and servo motors using microprocessor kit

3. Control of photo and ultrasonic, positional and velocity sensors
4. To practice in Programming of PLC, Pick and place robot and Machine vision systems.

LIST OF EXPERIMENTS

1. Design and formation of different Hydraulic circuits and Pneumatic circuits
2. Speed control of stepper and servo motors using microprocessor kit
3. Photo sensors and Ultrasonic sensors
4. Positional and velocity sensors
5. PID controller
6. Writing program for pick and place operation of a robot.
7. Exposure to Machine vision System
8. Experiments using PLC
9. Programming through virtual instrumentation.

TOTAL 30

REFERENCE

Laboratory Manual

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
			×			×						×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Mr.R.Murugesan										

		L	**T**	**P**	**C**
ME0324	**HEAT AND MASS TRANSFER LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

This course provides the necessary background for an engineer to understand the fundamental modes of heat transfer by doing experiments in various heat transfer equipment, observing data and analyzing the results. This makes the students gain confidence before entering the actual arena

INSTRUCTIONAL OBJECTIVES

1. To experimentally analyze conduction, convection and radiation.
2. Performance study on fins, heat exchanger, refrigeration and air conditioning systems are included.

LIST OF EXPERIMENTS

1. Thermal Conductivity of a specimen by guarded hot plate apparatus.
2. Heat transfer from pin fin by natural convection / forced convection.
3. Heat transfer through lagged pipe and composite lagged pipe.
4. Heat transfer by natural and forced convection.
5. Analysis of Parallel flow / Counter flow Heat exchanger
6. Determination of emissivity and Stefan – Boltzman's constant
7. Heat transfer through a composite wall.
8. Performance analysis on a Refrigeration Test Rig.
9. Performance analysis on an Air conditioning Test Rig.

TOTAL 30

REFERENCE

Laboratory Manual

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×			×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Mr.P.Sudhakar										

		L	**T**	**P**	**C**
ME0328	**COMPRHENSION II**	**0**	**2**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE

The students will be vigorously tested on the understanding of all the concepts in engineering that they have learnt so far in the Mechanical Engineering programme. This will enable the students gain the confidence and competence to solve real life engineering problems.

IMPLEMENTATION

Class room exercises, group discussions, case studies and topics on how the stuff works are assigned to students on an individual basis and evaluation done by a panel of teachers. The students are required to take-up an end semester examination and obtain a minimum mark for gaining the required credit.

TOTAL 30

Course designed by		Department of Mechanical Engineering									
1	Student Outcome	a	b	c	D	e	f	g	h	i	j	k
					×	×		×				
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)			PROFESSIONAL SUBJECTS (P)			
									X			
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
								X				
4	Course Coordinator	Mr.V.Magesh										

SEMESTER VII

		L	T	P	C
ME0401	**ECONOMICS AND PRINCIPLES OF MANAGEMENT**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To become familiarized about Engineering Economics and Principles Management.

INSTRUCTIONAL OBJECTIVES

The course will enable the students to become familiar with

1. The different engineering economic principles and strategies
2. Principles of organizational management
3. Behaviour of human at organizations with modern management concepts.

UNIT 1 ENGINEERING ECONOMICS **9**

Introduction – Economics – Scope and Definition – Importance of Economics in Engineering - Economic optimization- Demand and Revenue Analysis – Law of Demand - Demand Forecasting –Methods of Demand Forecasting - Demand curves – Factors affecting Demand – Demand Elasticity - Production Analysis - simple problems.

UNIT 2 SUPPLY, COST AND OUTPUT **9**

Supply – Supply schedule – Law of Supply – Elasticity of Supply - Cost and Supply Analysis – Types of Costs - Price and output Determination – Price Fixation – Pricing methods - Pricing Policies – Factors governing Pricing Policies – Break-Even analysis – Estimation of Break-Even Point - Usefulness of BEP – Limitations – simple problems.

UNIT 3 MANAGEMENT AND ITS ENVIRONMENT **9**

Management – Definition – Functions – Evolution of Modern Management movement – Different Schools of Management - Types and Forms of Business Organization - Designing effective organizations - Individual ownership – Partnership – Joint stock companies – Cooperative enterprises – Public Sector Undertakings.

UNIT 4 MANAGEMENT OF HUMAN AT WORK **9**

Human Resource Development – Motivating individuals and workgroups – Leadership for Managerial Effectiveness – Team working and Creativity – Managerial Communication – Time Management – Performance Appraisal– Career Planning.

UNIT 5 MODERN MANAGEMENT CONCEPTS **9**

Management by Objectives (MBO) – Principles and Steps – Advantages and Disadvantages - Management by Exception (MBE) – Strategic management – SWOT analysis - Enterprise Resource Planning (ERP) - Supply Chain Management (SCM) – Activity Based Management (ABM).

TOTAL 45

TEXT BOOKS

1. Murphy W. R. and Mc Kay. G., *Energy Management,* Butterworths, London.
2. Chandran, J. S., *Organizational Behaviours*, Vikas Publishing House Pvt. Ltd., New Delhi, 1994.
3. Ernest Dale, *Management Theory and Practice*, International Student Edition, McGraw Hill Publishing Co., New Delhi.

REFERENCE BOOKS

1. Richard Pettinger, Mastering Organizational Behaviour, Macmillan Press, London, 2000.
2. Chaiger, N. A., Energy Consumption and Environment, McGraw Hill Publishing Co., New Delhi, 1981.
3. Gail Freeman - Bell and Janes Balkwill, “Management in Engineering – Principles and Practive ", Prentice Hall of India Pvt.Ltd., 1998.
4. R.R. Barathwal, “Engineering Economics ", McGraw Hill, 1997.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	D	e	f	g	h	i	j	k
				×		×			×			
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)		
		X										
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
								X				
4	Course Coordinator	Mr. G. Balaji										

		L	T	P	C
ME0403	METROLOGY AND QUALITY CONTROL	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To highlight the basics of metrology and SQC.

INSTRUCTIONAL OBJECTIVES

To make the student to understand

1. Various comparative measurements.
2. Fundamentals of gears, thread measurements and measurements of surface finish.
3. Principle of light wave interference and applications of light wave interference for measurements.
4. Control chart techniques in quality control.
5. Purpose and use of sampling and its benefits.

UNIT 1 INTRODUCTION TO METROLOGY **9**

Basic Concepts - Legal Metrology - Precision - Accuracy - Types of errors - Linear and Angular Measurements - Standards of Measurements - Slip gauges - Calibration - Interchangeability and selective assembly.

Introduction to Comparators - Types of Comparators - Mechanical, Mechanical – Optical, Electrical and Electronic, pneumatic, Fluid Displacement - Automatic gauging machines. Co ordinate Measuring Machine.

UNIT 2 SCREW THREAD – GEAR MEASUREMENTS – SURFACE FINISH **9**

Internal and External screw threads : Measurements of various elements of thread - Best size wire - Two and three wire method. **Gear:** Measurements of various elements - Constant chord method - Base tangent method. **Surface Finish:** Surface topography definitions - Measurement of Surface Texture - Methods - Evaluation of Surface finish.

UNIT 3 INTERFEROMETRY **9**

Principle of light wave interference - Light sources - Types of Interferometers - Michelson, Twyman Green Specialisation of Michelson, NPL flatness Interferometers, The Pitter NPL gauge - laser interferometer. Measurement of straightness - Flatness - squareness - parallelism - circularity - and Rotation.

UNIT 4 STATISTICAL QUALITY CONTROL **9**

Introduction - Definition of Quality - Chance Causes and assignable Causes - SQC Benefits and Limitations. Fundamental concepts in probability - Normal curve - Measures of Dispersion - Distributions - Binomial, Poisson, Geometric, Hyper geometric, Poisson as an approximation to Binomial, Normal as an approximation to Binomial.

Theory of Control Charts: Control Charts for Variables - bar and R charts, Standard deviation charts - run up - run down - Process capability studies. Control Charts for attributes - Fraction defectives - And number of defects - chart sensitivity - Control charts for Non Conformities - C and U chart.

UNIT 5 ACCEPTANCE SAMPLING **9**

Basic Concepts and OC curve - AQL - LTPD - AOQL - Sampling Plans - Simple - Double - Multiple and sequential sampling plans - stratified sampling plans for variables. Related problems using BIS code books.

TOTAL 45

TEXT BOOKS

1. Jain. R. K., *Engineering Metrology*, Khanna Publishers, New Delhi, 1987.
2. Gupta. R. C., *Statistical Quality Control*, Khanna Publishers, New Delhi, 1994.

REFERENCE BOOKS

1. Doeblin, E. O., *Measurement System Applications and Design*,1st Edition McGraw Hill, London, 1990.
2. Grant E. L., *Statistical Quality Control,* McGraw Hill, New York, 1984.
3. Gaylor, Shotbolt and Sharp, *" Metrology for Engineers ", O.R.Cassel, London, 1993.*

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×			×			
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Mrs.A.Vijaya										

		L	T	P	C
ME0405	**DESIGN OF TRANSMISSION SYSTEM**	**2**	**2**	**0**	**3**
	Prerequisite				
	Nil				

(Use of approved data book permitted)

PURPOSE

To study the design of various mechanical transmission systems.

INSTRUCTIONAL OBJECTIVES

To familiarize the students with the design of:

1. Friction drives
2. Gears
3. Speed reducers
4. and other transmission systems

UNIT 1 DESIGN OF FLEXIBLE DRIVES **6**

Design of flat belt, V-Belt, rope and chain drives.

UNIT 2 DESIGN OF GEAR DRIVES – I **6**

Design of Spur Gear & Helical gear. Lewi's and Buckingham's method also to be introduced.

UNIT 3 DESIGN OF GEAR DRIVES – II **6**

Design of Bevel & Worm gear, Lewi's and Buckingham's method also to be introduced. Design of Power Screws.

UNIT 4 SIMPLE TRANSMISSION MEMBERS **6**

Design and selection of sliding contact bearing, rolling contact bearing. Design of axles, shafts and keys.

UNIT 5 DESIGN OF GEAR BOX **6**

Design of Multi speed gear box for machine tool – Structural diagram, ray diagram, speed diagram, No. of teeth calculation, Meshing arrangement.

TUTORIAL 30

TOTAL 60

TEXT BOOKS

1. Prabhu, T. J., *Design of Transmission Systems*, Private Publication, 1999.
2. Mehtha, N. K., *Machine Tool Design*,
3. Shigley J., *Mechanical Engineering Design*, Mc Graw Hill, 2001.

.

REFERENCE BOOKS

1. Norton R.L., *Design of Machinery*, McGraw Hill, 1999.
2. Spots, M. F., *Design of Machine Elements*, Prentice Hall of India Private Ltd., New Delhi, 1983.
3. William Orthwein, *Machine Component Design*, Vol. I and II, Jaico Publising house, Chennai,1996.
4. Maitra, *Handbook of Gear Design*, Tata Mcgraw-Hill, New Delhi, 1986.
5. *Design Data,* PSG College of Technology, 2006.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	E	f	g	h	i	j	k
		×		×		×			×			
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)					PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
				X								
4	Course Coordinator	Mr. E. Vijayaragavan										

		L	T	P	C
ME0407	COMPUTER AIDED MANUFACTURING	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To familiarize the components of computer aided manufacturing and to introduce CNC machines and computer aided process planning.

INSTRUCTIONAL OBJECTIVES

To familiarize the students

1. Basics of manufacturing automation
2. CNC machines and its constructional features and part programming
3. Basics of computer aided inspection
4. Automated material handling systems
5. Computer aided production planning.

UNIT 1 MANUFACTURING SYSTEMS AND CNC MACHINE **10**

Manufacturing systems – types, current trends, automation in manufacturing. Group technology - part families, coding and classification - Production Flow Analysis, FMS - principle, CIM – principle. Fundamentals of CNC machines- principles of operation - features - Classification - Developments, Machining Centers.

UNIT 2 ELEMENTS OF CNC MACHINE **9**

Interpolations - Open loop and closed loop control systems - CNC controllers - Direct Numerical Control, Adaptive Control - Machine structures, slide ways, linear bearings, Recirculating ball screws, Drives – spindle and feed drives - Feed back devices, ATC and automatic pallet system.

UNIT 3 PART PROGRAMMING **9**

Types of part programming – Manual part programming – Fixed cycle, Subroutines, DO LOOP, MACROS, NC codes-NC programming of simple turning and milling parts, Computer Aided Part Programming - Introduction to CAM Software's - NC Programming with interactive graphics.

UNIT 4 COMPUTER AIDED INSPECTION AND HANDLING SYSTEMS 8

Computer Aided Inspection and Quality Control - Non contact inspection - Computer aided testing - Automated material handling systems (conveyor, automated guided vehicle, pallets etc.) - Automated storage and retrieval systems.

UNIT 5 COMPUTER AIDED PRODUCTION PLANNING AND CONTROL 9

Introduction to Computer aided production planning - Application of computers - Shop floor monitoring - Materials requirement planning and Case study - Inventory control and Case study, JIT approach and Case study.

TOTAL 45

TEXT BOOKS

1. Rao, P. N., Tewari N. K. and Kundra, T.K., *Computer Aided Manufacturing*, Tata McGraw-Hill, New Delhi, 2001.
2. Mikell P. Groover, Emory W. Zimmers Jr., *Computer Aided Design and Manufacturing*, Prentice Hall of India Private Ltd., New Delhi, 1996.
3. Mikell P. Groover, *Automation, Production systems and computer integrated manufacturing*, Prentice Hall of India Private Ltd., New Delhi, 2001.

REFERENCE BOOKS

1. Ibrahim Zeid, *CAD/CAM Theory and Practice*, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2001.
2. James Madison, *CNC Machining Hand Book*, Industrial Press Inc., New York, 1996.
3. Barry Hawkes, *The CAD/CAM Process*, Wheeler Publishing, 1992.
4. Hans B. Kief and Frederick Waters, T., *Computer Numerical Control - A CNC Reference Guide*, Macmillan / McGraw-Hill, New York, 1992.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**E**	**f**	**g**	**h**	**i**	**j**	**k**
				×								×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Mr.S.Olivernesaraj										

		L	T	P	C
MA0461	**PROBABILITY AND STATISTICS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To develop a thorough understanding of the methods of probability and statistics which are used to model engineering problems.

INSTRUCTIONAL OBJECTIVES

At the end of the semester, the student will be able:

- To apply the basic rules and theorems of probability to solve engineering problems.
- To appropriately choose, define and/or derive probability distributions such as the Binomial, Poisson and Normal etc to model and solve engineering problems.
- To learn how to formulate and test hypotheses about means, variances and proportions and to draw conclusions based on the results of statistical tests.
- To understand how regression analysis can be used to develop an equation that estimates how two variables are related.
- To understand the fundamentals of quality control and the methods used to control systems and processes.

Probability and Random Variables 9

Sample space, Random experiments and random variables, Concept of probability, Conditional probability, Addition and multiplication laws, Baye's theorem - One dimensional Random Variables- Expectation, Variance, Covariance, and Moments.

Theoretical Distributions 9

Discrete: Binomial, Poisson, Geometric, Negative Binomial; Continuous: Exponential and Normal Distributions, their properties and applications to industrial problems.

Testing of Hypothesis 9

Introduction – Large sample tests based on normal distribution - Test for single mean, difference between means, proportion, difference between proportion, Small sample tests based on t, F distributions- Test for single mean, difference between means, standard deviation, difference between standard deviation. Chi-square test for goodness of fit, independence of attributes.

Correlation, Regression and Analysis of Variance 9

Pearson's Correlation coefficient- Spearman's Rank correlation coefficient Regression Concepts – Regression lines – Multiple correlation and regression. Analysis of Variance- One-way classification and two way classification.

Statistical Quality Control 9

Introduction – Process control – control charts for variables - X and R, X and s charts control charts for attributes: p chart, np chart, c chart and their applications in process control.

. **Tutorial 15 Periods**

Total 60 Periods

TEXT BOOKS

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 9th extensively revised edition, Sultan Chand & Sons, 1999
2. Ross. S., "A first Course in Probability", Fifth Edition, Pearson Education, Delhi 2002. Johnson. R. A., "Miller & Freund's Probability and Statistics for Engineers", Sixth Edition, Pearson Education, Delhi, 2000.
3. Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, "Probability and Statistics for Engineers and Scientists", Seventh Edition, Pearsons Education, Delhi, 2002.
4. Lipschutz. S and Schiller. J, "Schaum's outlines - Introduction to Probability and Statistics", McGraw-Hill, New Delhi, 1998.

5. Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill,1st Reprint 2004
6. Larsen and Marx, An Introduction to Mathematical Statistics and its Applications, 4th edition, Prentice-Hall, 2006.
7. Probability and Statistics for Engineers and Scientists, by R. E. Walpole, R. H. Myers, S. L. Myers and K. Ye, Eighth Edition.
8. Anthony J. Hayter, *Probability and Statistics for Engineers*, 2nd Edition

Course designed by		**Department of Mechanical Engineering**										
1	**Student outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		X										
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
4	**Course Coordinator**	**Ms.E.Sujatha**										

		L	**T**	**P**	**C**
ME0421	**METROLOGY AND QUALITY CONTROL LABORATORY**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To help the students understand the need of measurement and how to use linear and angular measuring instruments, gauges, etc

OBJECTIVE

1. To know the standards of measurement
2. To know about calibration
3. Use geometrical relations to find out the different measurements of different parameters.

LIST OF EXPERIMENTS

1. Use of Precision Measuring Instrument (Linear Measurement)
2. Use of Angle Measuring Instrument (Sine bar, Sine Center)
3. Measurement of tooth thickness by gear tooth vernier
4. Calibration of Dial gauge, Micrometer etc.
5. Taper and Bore Measurement using Spheres
6. Measurement of Angles between centerlines of holes drilled radially on a shaft
7. Process capability study using mechanical Comparator
8. Checking the dimension of a part using slip gauge.
9. Measurement using Pneumatic Comparator
10. Fundamental dimension of a gear using profile projector.
11. Testing the square ness of a try square using slip gauge.
12. Study Experiments:
    - Checking the straightness using auto collimator
    - Measurement of thread parameters using floating carriage micrometer
    - Measurement of surface roughness using roughness tester

TOTAL 30

REFERENCE

Laboratory Manual

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	E	f	g	h	i	j	k
		×	×			×						×
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
		X										
4	Course Coordinator	Mrs.A.Vijaya										

		L	T	P	C
ME0423	COMPUTER AIDED MANUFACTURING LABORATORY	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

To familiarize programming techniques in CNC part programming and the machining procedure in CNC machines .

INSTRUCTIONAL OBJECTIVES

To familiarize the students in

1. Part programming for Lathe operations and milling operations
2. Canned cycles for different operations
3. Machining of components using CNC Lathe and CNC milling machine
4. CAM software.

LIST OF EXPERIMENTS

1. Manual part programming for CNC machines using standard G and M codes.

CNC LATHE

Part programming for Turning, Facing, Chamfering, Grooving, Step turning, Taper turning, Circular interpolation, Combination of few operations.

CNC MILLING MACHINE

Part programming for Point to point motions, Line motions, Circular interpolation, Contour motion, Pocket milling- circular, rectangular, Mirror commands.

2. Part Programming using Fixed or Canned Cycles for Drilling, Peck drilling, Boring, Tapping, Turning, Facing, Taper turning Thread cutting.
3. Simulation of Tool Path for different operations
4. Machining of small components using CNC Lathe & CNC Milling Machine.
5. Exposure to component modeling and CL data generation using CAM software.
6. Exposure to numerical control wire-cut EDM

TOTAL 30

REFERENCE

Laboratory Manual

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	E	f	g	h	i	j	k
			×			×						×
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)		
										X		
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
		X										
4	Course Coordinator	Mr.S.Olivernesaraj										

		L	T	P	C
ME0425	INDUSTRIAL TRAINING – II	0	2	0	1
	Prerequisite				
	Nil				

PURPOSE

To expose the students to the industry working environment.

IMPLEMENTATION

A minimum of two weeks in-plant training has to be undergone by the student during summer / winter vacation following IV / V semester. A certificate from company to the effect that he has had undergone the training successfully has to be produced after the training. The student is required to present a report on the observations and knowledge gained during the training which will be evaluated by a panel of faculty members.

TOTAL 15

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	E	f	g	h	i	j	k
				×	×	×		×	×		×	
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
								X				
4	Course Coordinator	Mr.D.Premnath										

SEMESTER VIII

		L	T	P	C
ME0422	**PROJECT WORK**	**0**	**0**	**17**	**8**

Hardware/ Numerical /Theoretical research and development work is to be allotted. A maximum number of three students may be involved in each project. However the contribution of the individuals in the project should be clearly brought out. The combined project report is to be submitted as per the university regulations. A seminar has to be presented on the allotted topic. All the students involved in the project will be examined for their contribution.

Total 255

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×	×	×	×		×	×	×		×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	**Mr.R.Senthil**										

ELECTIVES

		L	T	P	C
ME0001	**FINITE ELEMENT METHODS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To understand the basics of finite element analysis and its applications in engineering.

INSTRUCTIONAL OBJECTIVES

To familiarise the

1. Basics of Finite Element analysis
2. Rayleigh-Ritz method for static analysis
3. Different elements like truss, beam, triangular, quadrilateral and brick elements.
4. Analysis of one dimensional and two dimensional problems with the help of softwares.

UNIT I INTRODUCTION TO FINITE ELEMENT ANALYSIS 8

Basics of FEA, historical comments, FEM applications. General field problems in engineering- Modeling – Discrete and continuous models – Characteristics - Difficulties involved in solution - The relevance and place of FEM. Boundary and initial value problems concepts.

UNIT II CALCULUS OF VARIATIONS 9

Variational formulation in FEM, weighted residual methods – Galerkin method, sub domain method, method of least square and collocation method - The Ritz Method - Simple numerical problems.

UNIT III STATIC ANALYSIS 9

General procedure of FEM, skeletal and continuum structures, descritization of domain, basic types of elements - truss, beam, triangular, quadrilateral and brick elements - shape functions, Rayleigh-Ritz method, formulation of element stiffness matrices - Isoparametric elements.

UNIT IV FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS 9

One dimensional second order equations -Generalized coordinate approach, derivation of element equation - Assembly of element equation - Imposition of boundary conditions - Solution of equation - Cholesky method - Extension of the method to fourth order equation - Time dependent problems from heat transfer and solid mechanics - Heat transfer through simple fins, composite wall, bending of beams.

UNIT V FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS 10

Global and natural coordinates - second order equations involving scalar valued function - model equation - Variational formulation - Finite element formulation through generalised coordinate approach – Convergence criteria for chosen models - Interpolation functions - Element matrices - Problems on bending of plates and heat transfer in two dimensions.

INTRODUCTION TO ADVANCED TOPICS

(Only preliminaries to be covered. Not included for examination)

Three dimensional problems, use of software packages.

TOTAL 45

TEXT BOOKS

1. Chandrupatla and Belegundu, *Finite Elements in Engineering*, Prentice Hall of India Pvt. Ltd., 1997.
2. Reddy, J. N., *An Introduction to Finite Element Method,* McGraw Hill International Editions, 1993.

REFERENCE BOOKS

1. Rao, S. S., *The Finite Element Methods in Engineering*, Pregamon Press, 1989.
2. Krishnamoorthy, C. S., *Finite Element Analysis -Theory and Programming*, Tata McGraw Hill publishing Co., 1987.
3. Zienkiewicz, O. C., *The Finite Element Method in Engg. Science*, McGraw Hill, London, 1977.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	E	f	g	h	i	j	k
		×		×		×					×	×

2	Category	GENERAL (G)	BASIC SCIENCES (B)	ENGINEERING SCIENCES AND TECHNICAL ART (E)	PROFESSIONAL SUBJECTS (P)
					X

3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing	Design	Thermal	Genaral		
			X				

4	Course Coordinator	Dr.S.H.Venkatasubramanian

		L	T	P	C
ME0002	ROBOTICS ENGINEERING AND ITS APPLICATIONS	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To impart knowledge about the engineering aspects of Robots and their applications

INSTRUCTIONAL OBJECTIVES

To familiarize the

1. Basics of robots
2. Control system and end effectors
3. Sensor technology
4. Industrial application of robot

UNIT I INTRODUCTION **8**

Basic concepts - Robot anatomy - Manipulators - kinematics: Forward and inverse kinematics - Precision movement, robot specifications and Work volume, Types of Robot drives - Basic robot motions - Point to point control, continuous path control.

UNIT II END EFFECTORS **9**

End effectors - classification – mechanical, magnetic, vacuum and adhesive gripper - gripper force analysis and design. Robot control - unit control system concept – servo and non-servo control of robot joints, adaptive and optimal control.

UNIT III SENSORS **9**

Sensor devices, Types of sensors - contact, position and displacement sensors, Force and torque sensors - Proximity and range sensors - acoustic sensors - Robot vision systems - Sensing and digitizing - Image processing and analysis.

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UNIT IV ROBOT PROGRAMMING **9**

Robot language classification – programming methods - off and on line programming - Lead through method - Teach pendent method - VAL systems and language, simple program.

UNIT V INDUSTRIAL APPLICATIONS **10**

Application of robots - Material handling - Machine loading and unloading, Assembly, Inspection, Welding, Spray painting, Mobile robot, Microbots – Recent developments in robotics- safety considerations.

TOTAL **45**

TEXT BOOKS

1. Deb, S. R., *Robotics technology and flexible automation*, Tata McGraw Hill publishing company limited, New Delhi, 1994
2. Mikell P. Groover, *Industrial Robotics Technology Programming and Applications*, McGraw Hill Co., Singapore, 1995.

REFERENCE BOOKS

1. Klafter, R. D, Chmielewski, T. A. and Noggins, *Robot Engineering : An Integrated Approach*, Prentice Hall of India Pvt. Ltd., New Delhi, 1994.
2. Fu, K. S., Gonzalez, R. C., & Lee, C.S.G., *Robotics control, sensing, vision and intelligence*, McGraw Hill Book Co., Singapore, 1987.
3. Craig, J. J., *Introduction to Robotics mechanics and control*, Addison-Wesley, London, 1999.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×		×		×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**					**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	Mr.S.Balamurugan										

		L	**T**	**P**	**C**
ME0003	**MECHANISM DESIGN ANALYSIS AND SYNTHESIS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To study how various mechanisms can be designed.

INSTRUCTIONAL OBJECTIVES

1. Study of kinematics of various mechanisms and kinematic synthesis of linkages.
2. Study of various graphical constructions of acceleration analysis.
3. Static and dynamic force analysis of linkages.
4. Kinematic analysis and kinematic synthesis of spatial mechanisms.

UNIT I KINEMATIC ANALYSIS OF MECHANISMS 9

Review of Fundamentals of Kinematics - Mobility Analysis - Classifications of Mechanisms - Kinematic Inversion - Grashoff's law - Mechanical Advantage - Transmission Angle - Position Analysis - Vector loop Equations for four bar, Slider Crank, Six bar linkages - Analytical and Graphical methods for velocity and acceleration analysis - Four bar linkage jerk analysis. Plane complex mechanism.

UNIT II KINEMATIC SYNTHESIS OF LINKAGES 9

Type, Number and Dimensional Synthesis - Function Generation - Path Generation and Motion Generation. - Graphical Methods: Two Position, Three Position and Four Position synthesis of four bar Mechanism, Slider crank Mechanism, Precision positions Over lay Method. Analytical Methods: Blotch's Synthesis - Freudestien's Method - Coupler curve Synthesis - Cognate linkages - The Roberts - Chebyshev theorem.

UNIT III PATH CURVATURE THEORY 9

Fixed and moving centrodes. - Hartmann's Construction - Inflection Points, The Inflection Circle - The Euler - Savary Equation - The collination axis and Bobiller's theorem - Conjugate points and inverse motion - The cubic Stationary curvature - Ball's Point.

UNIT IV DYNAMICS OF MECHANISMS 9

Static force analysis - Inertia force analysis - Combined static and inertia force Analysis - Shaking force - Kinematic analysis - Introduction to force and moment balancing of linkages.

UNIT V SPATIAL MECHANISMS AND ROBOTICS 9

Introduction: Mobility of mechanisms – Description of spatial motions - Kinematic analysis of spatial mechanism - Kinematic sythesis of spatial mechanisms: position, velocity and acceleration analysis. Eulerian Angles - Introduction to Robotic Manipulators - Topological arrangements of robotic arms - Kinematic analysis of spatial mechanism - Devavit - Hartenberg Parameters, Forward and inverse kinematics of robotic manipulators.

TOTAL 45

TEXT BOOKS

1. Shigley, J. E., and Uicker J. J., *Theory of Machines and Mechanisms,* McGraw Hill,1980.
2. Rao, J. S., and Dukkipatti, R.V., *Mechanisms and Machine Theory,* 2nd Edition, New Age international (P) Ltd., 1995.

REFERENCE BOOKS

1. Sandor, G. N. and Erdman A. G., *Mechanism Design, Analysis and Synthesis* Vol: I and Vol: II, Prentice Hall, 1984.
2. Norton, R. L., *Design of Machinery,* McGraw Hill, 1999.
3. Hamilton H Mabie and Charles F. Reinhofz, *Mechanisms and Dynamics of Machinery*, John Wiley & Sons, 1987.
4. Amitabha Ghose and Ashok Kumar Malik, *Theory of Mechanisms and Machines,* EWLP, Delhi, 1999.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
				×		×					×	×
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)					PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
				X								
4	Course Coordinator	Dr.P.Nandakumar										

		L	T	P	C
ME0004	DIGITAL IMAGE PROCESSING AND MACHINE VISION	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To study the basic concepts of image processing techniques and machine vision techniques.

INSTRUCTIONAL OBJECTIVES

To familiarize

1. Basic concepts of digital image processing
2. Various steps involved in digital image processing
3. Techniques involved in machine vision

UNIT I DIGITAL IMAGE FUNDAMENTALS **9**

Elements of digital image processing systems - Elements of visual perception - Image sampling and quantization, - Matrix and singular value representation of discrete images.

UNIT II IMAGE TRANSFORMS AND EDGE DETECTION **9**

Transformation-1D DFT, 2D DFT, Cosine, Sine, - Hadamard, Haar, Slant, KL, SVD transforms and their properties.

Edge detection - Roberts operator, - Sobel operator - Prewitt operator.

UNIT III IMAGE ENHANCEMENT **9**

Histogram modification and specification techniques - Image smoothing - Image sharpening - Generation of spatial masks from frequency domain specification - Nonlinear filters, Homomorphic filtering - False color, Pseudocolor and color image processing.

UNIT IV IMAGE RESTORATION AND COMPRESSION **9**

Image degradation models - Unconstrained and constrained restoration - Inverse filtering - Least mean square filter, Pattern classes - Optimal statistical classifiers.

Runlength - Huffman coding - Shift codes - Arithmetic coding, bit plane coding, transform coding, JPEG Standard, - Wavelet transform - Predictive techniques - Block truncation coding schemes - Facet modeling.

UNIT V MACHINE VISION **9**

Machine Vision – Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD,CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications

TOTAL 45

TEXT BOOKS

1. Anil K. Jain, *Fundamentals Of Digital Image Processing*, Prentice Hall of India, New Delhi, 1997.
2. Rafel C.Gonzalez and Richard E.Woods, *Digital Image Processing*, Addison Wesley, New York, 1993.
3. Vernon, D., *Machine Vision - Automated Visual Inspection and Robot Vision,* Prentice Hall International Ltd., New York, 1991.

REFERENCE BOOKS

1. William K. Pratt, *Digital Image Processing*, John Wiley, New York, 1987.
2. Sid Ahmed M. A., *Image Processing Theory, Alogorithms and Architectures*, McGraw-Hill, New York, 1995.
3. Umbaugh. S. E., *Computer Vision and image processing – Practical approach using CVIP tools,* Prentice Hall of India, New Delhi, 1998.
4. Ramesh Jain, Rangachar Kasturi and Brain G. Schunk, *Machine Vision,* McGraw Hill International Editions, Computer Science Series, Singapore, 1995.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**					**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	Dr. M.R.Stalin john										

		L	T	P	C
ME0005	**DESIGN FOR MANUFACTURE AND ASSEMBLY**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To study how a design can be made suitable for various manufacturing and assembly process requirements.

INSTRUCTIONAL OBJECTIVES

1. To study the various factors influencing the manufacturability of components and the use of tolerances in manufacturing
2. Application of this study to various forging, casting, welding and machining processes
3. To study about the various assembly methods and processes and design for assembly guidelines

UNIT I INTRODUCTION TO DFM **9**

Qualities of a designer - Systematic working plan - Factors influencing choice of materials - Manufacturing methods. Process capability. Tolerances – Relevant to manufacturing, assembly. Tolerance stack – effects on assembly – Methods of eliminating tolerance stack.

UNIT II FORM DESIGN – CASTING AND WELDING **9**

Influence of loading, materials, production methods on form design. Casting considerations – Requirements and rules. Welding considerations – Requirements and rules. Redesign of components for castings. Redesign of components for welding. Case studies.

UNIT III FORM DESIGN – FORGING AND MACHINING **9**

Forging considerations – Requirements and rules. Choice between casting, forging and welding. Machining considerations – Requirements and rules. Redesign of components for forging. Redesign of components for machining. Case studies.

UNIT IV INTRODUCTION TO DFA **9**

Distinction between assembly methods and processes. Factors determining assembly methods and processes. Design factors independent of methods and processes. Design factors dependent on methods. Design factors dependent on processes.

UNIT V DESIGN FOR ASSEMBLY METHODS **9**

Approaches to design for assembly – Approaches based on design principles and rules - Qualitative evaluation procedures, knowledge based approach, Computer aided DFA methods. Assemblability measures. Boothroyd – Dewhurst DFA method – Redesign of a simple product. Case studies.

TOTAL **45**

TEXT BOOKS

1. Harry Peck., *Design for Manufacture,* Pittman Publication, 1983.
2. Alan Redford and Chal, *Design for Assembly – Principles and Procedures,* McGraw Hill International Europe, London, 1994.

REFERENCE BOOKS

1. Robert Matousek., *Engineering Design – A Systematic Approach*, Blackie & Sons Ltd., 1963.
2. James G. Bralla, *Hand Book of Product Design for Manufacturing*, McGraw Hill Co., 1986
3. Swift, K. G., *Knowledge Based Design for Manufacture,* Kogan Page Ltd., 1987.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		×		×		×					×	
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
				X								
4	Course Coordinator	Mr.V.Magesh										

		L	T	P	C
ME0007	NEURAL NETWORK AND FUZZY SYSTEMS	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To study the basic concepts of neural networks techniques and fuzzy logic

INSTRUCTIONAL OBJECTIVES

To familiarize

1. Techniques involved in neural networks
2. Techniques involved in fuzzy systems

UNIT I INTRODUCTION TO NEURAL NETWORKS **9**

Biological foundations - ANN models - Types of activation functions - Introduction to network architectures : Multi layer feed forward network (MLFFN), Radial basis function network (RBFN), Recurring neural network (RNN)

UNIT I LEARNING ALGORITHMS **9**

Learning process – Supervised and unsupervised learning – Error-correction learning - Hebbian learning - Boltzmaen learning - Single layer and multiplayer percepturs - Least mean square algorithm - Back propagation algorithm. - Applications in forecasting and pattern recognition and other engineering problems.

UNIT III INTRODUCTION TO FUZZY LOGIC **.9**

Fuzzy sets – Fuzzy relations – Fuzzy conditional statements – Fuzzy rules – Fuzzy algorithm.

UNIT IV FUZZY LOGIC CONTROL SYSTEM **9**

Fuzzy logic controller – Fuzzification interface – Knowledge base – Decision making logic – Defuzzification interface – Design of fuzzy logic controller – Case study.

UNIT V NEURO-FUZZY LOGIC CONTROL **9**

Optimisation of membership function and rules base of fuzzy logic controller using neural networks – Genetic algorithm – Fuzzy neuron – Adaptive fuzzy systems – Case study.

TOTAL **45**

TEXT BOOKS

1. Jacek M. Zurada, *Introduction to artificial Neural Systems*, Jaico Publishing House, Mumbai, 1997.
2. Simon Haykins, *Neural Networks – A comprehensive foundation*, Macmillan College, Proc. Con. Inc. New York, 1994.
3. Zimmermann H. J., *Fuzzy set theory and its applications*, Allied Publication Ltd., Chennai, 1996.

REFERENCES

1. Tsoukalas L. H. and Robert E. Uhrig., *Fuzzy and Neural approach in Engineering*, John Wiley and Sons, New York, 1997.
2. Klir, G. J. and Yuan, B. B., *Fuzzy sets and fuzzy logic*, Prentice Hall of India, New Delhi, 1997.
3. Driankov, D., Hellendron, H. and Reinfrank, M., *An Introduction to Fuzzy control*, Narosa publishing House, New Delhi, 1996.
4. Millon, W. T., Sutton, R. S. and Webrose, P. J., *Neural Networks for control*, MIT University Press, 1992.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**			**PROFESSIONAL SUBJECTS (P)**			
									X			
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	Mr. M.R.Stalin john										

		L	**T**	**P**	**C**
ME0008	**INDUSTRIAL TRIBOLOGY**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

(Approved Hand Book may be used in the Examination)

PURPOSE

To present the engineering concepts of friction, its effects and different lubrication theories and types used in industries.

INSTRUCTIONAL OBJECTIVES

To make the students familiar with

1. The friction and wear in materials
2. The lubricants and their properties.
3. The preparation of bearing materials

UNIT I SURFACES AND FRICTION **9**

Topography of Engineering surfaces- Contact between surfaces - Sources of sliding Friction – Adhesion ploughing- Friction characteristics of metals - Friction of non metals- Friction of ceramic materials and polymers - Rolling friction - Source of rolling friction -Stick slip motion - Measurement of friction.

UNIT II WEAR **9**

Types of wear - Simple theory of sliding wear mechanism -Abrasive wear – Materials for adhesive and abrasive wear situations - Corrosive wear - Surface fatigue wear situations - Corrosive wear- Surface fatigue wear - Wear of ceramics and polymers - Wear measurements.

UNIT III FILM LUBRICATION THEORY ` **9**

Fluid film in simple shear - Viscous flow between very close parallel plates - Shear stress variation Reynolds equation for film lubrication - High speed unloaded journal bearings - Loaded journal bearings –The Somerfield diagram.

UNIT IV LUBRICANTS AND LUBRICATION TYPES **9**

Types and properties of Lubricants - Testing methods - Hydrodynamic Lubrication - Elasto hydrodynamic lubrication- Boundary Lubrication - Solid Lubrication Hydrostatic Lubrication.

UNIT V SURFACE ENGINEERING AND MATERIALS FOR BEARINGS **9**

Surface modifications - Transformation hardening - Surface fusion - Thermo chemical processes – Surface coatings - Plating and anodizing - Materials for rolling element bearings - Materials for fluid film bearings - Materials for marginally lubricated and dry bearings.

TOTAL 45

TEXT BOOKS

1. Hutchings, I. M., *Tribology, Friction and Wear of Engineering Material*, Edward Arnold, London, 1992.
2. Williams, J. A., *Engineering Tribology*, Oxford University Press,1994.

REFERENCE

1.. Stolarski T. A., *Tribology in Machine Design*, Industrial Press Inc., 1990.
2..Bowden, E. P., and Tabor. D., *Friction and Lubrication*, Heinemann Educational Books Ltd., 1974.
3. Cameron, A., *Basic Lubrication theory*, Longman, U.K., 1981.
4. Neale, M. J., (Editor), *Tribology Handbook*, Newnes Butter worth, Heinemann, U.K., 1975.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×		×		×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
				X								
4	**Course Coordinator**	Prof. K. Shanmugam										

		L	T	P	C
ME0021	**MODERN MANUFACTURING TECHNIQUES**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To develop the ability to understand the advanced manufacturing techniques evolved in manufacturing scenario.

INSTRUCTIONAL OBJECTIVES

At the end of this course the student should be able to understand

1. Advanced techniques in casting
2. Recent developments in forming and powder metallurgy
3. Fabrication of micro electronic devices
4. Precision machining techniques
5. Rapid prototyping and tooling

UNIT I ADVANCES IN CASTING **9**

Newer casting techniques - Expandable pattern casting - Plaster mold and ceramic mold casting - Vacuum casting - Squeeze casting and semisolid metal forming - Rapid solidification for amorphous alloys - Casting techniques for single crystal components.

UNIT II ADVANCED FORMING AND P/M PROCESSES **9**

High speed forging machines - Die materials - Peen forming of sheet metals - Super plastic forming - Forming and shaping glass. Design consideration for P/M forming - Production of metal powders – Compaction – Sintering – Selective laser Sintering - Finishing of sintered parts - Economic of P/M forming.

UNIT III FABRICATION OF MICRO ELECTRONIC DEVICES **9**

Semiconductors and silicon - Crystal growing and wafer preparation - Film deposition, Oxidation, Lithography, Etching, Metallization and testing - Bonding and packing.

UNIT IV PRECISION MACHINING **9**

Precision and Micro-machining - Diamond turning of parts to nanometer accuracy - Stereo microlithography machining of micro-sized components.

UNIT V RAPID PROTOTYPING AND TOOLING. **9**

Definition, evolution, CAD for RPT. Product design and rapid product development - Fundamentals of various RPT technologies - Creation of STL or SLA file from a 3D solid model - Principles and typical processes for quick batch production of plastic and metal parts through quick tooling.

TOTAL **45**

TEXT BOOK :

1. Serope Kalpakjian., *Manufacturing Engineering and Technology*, Third Edition, Addison-Wesley Publishing Co., Boston, 1995.
2. Madou, M. J., *Fundamentals of micro fabrication*, CRC Press, Boca ration, USA, 1997.

REFERENCE BOOKS :

1. Amstead, B. H., *Ostwald Phylips and Bageman.R.L., Manufacturing Processes*, John Wiley & Sons, New York, 1987.
3 Jaeger, R.C., *Introduction to microelectronic Fabrication*, Addision-Wesley, Boston, 1988.
4. Chua, C. K., *Rapid Prototyping*, John Wiley, New York, 1997.
5. Hilton., P. D. and Marcel Dekker, *Rapid Tooling*, New York, 2000.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
				×		×					×	
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)					PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
		X										
4	Course Coordinator	Dr. S. Prabhu										

		L	T	P	C
ME0022	PRECISION ENGINEERING	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To impart knowledge about basics of precision machining and different Manufacturing technique in precision engineering

INSTRUCTIONAL OBJECTIVES

1. The basics of precision engineering
2. The various techniques of precision engineering like Nano technology etc,
3. The accuracy, influence of static stiffness, vibration accuracy etc

UNIT I ACCURACY **9**

General concept of accuracy – Spindle rotation accuracy – Test methods-Displacement accuracy – Dimensional wear of cutting tools - Accuracy of NC systems - Clamping errors - Setting errors - Errors due to Location - Location of rectangular prism, cylinder.

UNIT II ACCEPTANCE TESTS FOR MACHINE TOOLS **9**

Basic type of tests – Measuring instruments used for testing machine tools - Alignment tests-Straightness, Flatness, Parallelism, Squareness, Circularity, Cylindricity.

UNIT III INFLUENCE OF STATIC STIFFNESS, THERMAL EFFECTS **9**

Static stiffness – Nature of deformation in a machine tool – Overall stiffness of a lathe – Compliance of work piece-Errors due to the variation of the cutting force and total compliance – Inaccuracies due to thermal effects – Methods of decreasing thermal effects-Influence of vibration on accuracy.

UNIT IV NANOTECHNOLOGY **9**

Introduction - Top down and bottom up approach - Development of Nanotechnology - Precision and micro-machining - Micro EDM. Diamond turning of parts to nanometer accuracy - Stereo microlithography. Carbon nanotubes - Production methods, applications. Nanomanufacturing.

UNIT V NANOMEASURING SYSTEMS **9**

In - Process measurement of position of processing point - Post process and on line measurement of dimensional features - Mechanical measuring systems - Optical measuring systems - Electron beam measuring systems - SEM and TEM - pattern recognition and inspection systems.

Applications of Nanotechnology: Nano – Lithography – Photolithography - Electorn beam lithography – Ion - Beam lithography - Nanocoatings - AFM applications.

TOTAL 45

TEXT BOOKS

1. Murthy R. L., *Precision Engineering in Manufacturing*, New Age International, New Delhi, 1996.
2. Norio Taniguchi, *Nanotechnology*, Oxford university press, Cambridge, 1996.

REFERENCE BOOKS

1. Lee Tong Hong, *Precision Motion control, Design and Implementation*, Springer Verlag, U.K., 2001.
2. Liangchi Zhang, *Precision Machining of Advanced Materials*, Trans Tech Publications Ltd., Switzerland, 2001.
3. Hiromu Nakazawa, *Principles of precision engineering*, Oxford university press,1994.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Dr. S. Prabhu										

		L	**T**	**P**	**C**
ME0023	**PRODUCTION MANAGEMENT**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To get acquainted with the basic aspects of Production Management.

INSTRUCTIONAL OBJECTIVES

1. The course attempts to discuss various important planning, organizing and controlling aspects of Operations Management.
2. Through text and case studies, this course prepares for a study of different operational issues in manufacturing and services organizations.

UNIT I INTRODUCTION **9**

History and overview of production management - Capacity planning, Location planning - Types of production processes. Layout planning - Productivity management.

UNIT II INVENTORY MANAGEMENT **9**

Deterministic and Probabilistic inventory management models - Purchasing and warehousing, Methods study, Motion study and Work measurement - Simple problems.

UNIT III SCHEDULING **9**

Job Evaluation - Wage incentive schemes - Value analysis – Forecasting - Aggregate planning - Scheduling: Gantt charts and Sequencing - Simple problems.

UNIT IV MRP **9**

Project Management with PERT/CPM - Material requirements - Planning (MRP) - Manufacturing - Resources planning (MRP II) - Enterprise resource planning (ERP)

UNIT V TQM **9**

Total Quality Management - Quality management systems - Statistical process control (SPC) - Maintenance management - Reliability and maintenance, Replacement techniques, Logistics and supply chain management.

TOTAL 45

TEXT BOOKS

1. Ahuja, K. K., *Production Management*, CBS Publishers, New Delhi, 1993.
2. Goel, B. S., *Production management*, Pragathi & prakasam publishers, Meerut, 1984.

REFERENCE BOOKS

1. Hajra Nirjhar Roy, *Production management*, MP Publishers, New Delhi, 1990.
2. Narang, G. B. S. and Kumar, V., *Production management*, Khanna publishers, New Delhi, 1989.
3. Agarwal and Jain, *Production management*, Khanna publishers, New Delhi, 1998.
4. Levin and Richard, *Production and operation management*, Tata McGraw Hill publications, New Delhi, 1990.

Course designed by		**Department of Mechanical Engineering**									
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×	×				×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**					**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Dr. S. Prabhu										

		L	T	P	C
ME0024	**ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS**	**3**	**0**	**0**	**3**

	Prerequisite				
	Nil				

PURPOSE

To study the basic concepts of artificial intelligence and neural networks techniques

INSTRUCTIONAL OBJECTIVES

To familiarize

1. Basic concepts of artificial intelligence
2. Various steps involved in artificial intelligence
3. Basic concepts of expert systems

UNIT 1 INTRODUCTION **9**

History - Definition of A.I., - Emulation of human cognitive process. - The knowledge search tradeoff - Stored knowledge - Semantic nets - An abstract view of modeling - Elementary knowledge - Computational logic - Analysis of compound statements using simple logic connectives - Predicate logic - Knowledge organization and manipulation - Knowledge acquisition.

UNIT II PROBLEM SOLVING AGENTS **9**

Problem Definition - Formulating problems - Searching for solutions - Measuring problem, Solving performance with examples. Search / Strategies - Uninformed or Blinded search - Breadth first search - Uniform cost search - Depth first search, Depth limited search - Iterative deepening - Depth first search – Bi - directional search - Comparing uniformed search strategies - Informed search strategies - Heuristic information - Hill climbing methods – Best First Search, Branch – and - Bound Search - Optimal search and A* and iterative deepening A*

UNIT III KNOWLEDGE ORGANISATION, COMMUNICATION **9**

Matching Techniques - Need for matching - Matching problem - Partial matching - Fuzzy matching - RETE matching algorithm - Knowledge organization - Indexing and Retrieval techniques – Integration of knowledge in memory organization systems – Perception - Communication and Expert System - Overview of linguistics - Basic semantic analysis and representation structures - Natural language generation.

UNIT IV INTRODUCTION TO PROGRAMMING LANGUAGE **9**

Introduction to Programming Language of AI and its advantages - Introduction to Lisp and its syntax - Lisp syntax - Numeric function - Difference between Lisp and Prolog - Lisp syntax – Input statements- Output statements and declaration of local variables - Interaction and recursion functions - Property list and arrays.

UNIT V EXPERT SYSTEMS **9**

Expert System- Introduction - Difference between expert system and conventional programs - Basic activities of expert system – Interpretation – Prediction – Diagnosis – Design – Planning – Monitoring – Debugging – Repair – Instruction – Control - Basic aspect of expert system - Acquisition module frames - Knowledge base, Production rules - Semantic net, Inference engine - Backward chaining and forward chaining - Explanatory interface.

TOTAL **45**

TEXT BOOKS

1. Elaine Rich and Kelvin Knight, *Artificial Intelligence*, Tata McGraw Hill, New Delhi, 1991.
2. Stuart Russell and Peter Norvig, *Artificial Intelligence: A modern approach*. Prentice Hall, New Jersey, 1995.

REFERENCE BOOKS

1. Nilson, N. J., *Principles of Artificial Intelligence*, Springer Verlag, Berlin, 1980.
2. Patterson, *Introduction to Artificial Intelligence and Expert systems*, Prentice Hall of India, New Delhi, 1990.
3. Eugene Charniak and Drew McDermot, *Introduction to Artificial Intelligence,* Addison Wesley Longman Inc., 1998

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	A	b	c	d	e	f	g	h	i	j	k
											×	×

2	Category	GENERAL (G)	BASIC SCIENCES (B)	ENGINEERING SCIENCES AND TECHNICAL ART (E)	PROFESSIONAL SUBJECTS (P)
					X

3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing	Design	Thermal	Genaral		
		X					

4	Course Coordinator	Mr. M.R.Stalin john

		L	T	P	C
ME0025	PROCESS PLANNING AND COST ESTIMATION	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To impart clear knowledge about process planning, costing and estimation of machining time.

INSTRUCTIONAL OBJECTIVES

To understand the basic concepts of

1. Process planning
2. Different methods of cost estimation in different manufacturing shops.

UNIT I PROCESS PLANNING **7**

Process planning: - Selection and analysis – Manual, Experience based planning – CAPP – Variant - Generative - Processes analysis – Types of Production.

UNIT II COSTING, ESTIMATION, COSTS AND EXPENSES **10**

Aims of costing and estimation – Functions and procedure – Introduction to costs, Computing material cost, Direct labor cost, Analysis of overhead costs - Factory expenses, Administrative expenses, Selling and distributing expenses – Cost ladder - Cost of product - Depreciation – Analysis of depreciation.

UNIT III ESITMATION OF COSTS IN DIFFERENT SHOPS **8**

Estimation in foundry shop – Pattern cost - Casting cost - Illustrative examples. Estimation in Forging shop – Losses in forging – Forging cost - Illustrative examples.

UNIT IV ESTIMATION OF COSTS IN FABRICATION SHOPS **8**

Estimation in welding shop – Gas cutting – Electric welding - Illustrative examples. Estimation in sheet metal shop – Shearing and forming - Illustrative examples.

UNIT V ESITMATION OF MACHINING TIMES AND COSTS **12**

Estimation of machining time for lathe operations - Estimation of machining time for drilling, boring, shaping, planning, milling and grinding operations - Illustrative examples.

TOTAL 45

TEXT BOOKS

1. Adithan, M. S., and Pabla, *Estimating and Costing*, Konark Publishers Pvt., Ltd, 1989.
2. Chitale, A. K., and Gupta, R. C., *Product Design and manufacturing*, Prentice Hall of India, New Delhi, 1997.

REFERENCE BOOKS

1. Nanua Singh, *System Approach to Computer Integrated Design and Manufacturing*, John Wiley & Sons, New York, 1996.
2. Joseph G. Monks, *Operations Management, Theory and Problems*, McGraw Hill Book Company, New Delhi, 1982.
3. Narang, G. B. S. and Kumar, V., *Production and Planning* , Khanna Publishers, New Delhi, 1995.
4. Banga, T. R. and Sharma, S. C., *Estimating and Costing*, Khanna publishers, New Delhi, 1986.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Mr.V.P.Haridasan										

		L	**T**	**P**	**C**
ME0026	**TOOL ENGINEERING AND DESIGN**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To develop in the engineering student the ability to design cutting tools and press tools for given condition.

INSTRUCTIONAL OBJECTIVES

At the end of this course the student should be able to understand

1. Tool materials and their properties
2. Design of single point cutting tools and twist drills
3. Design of various types of dies
4. Blank development for different components
5. Design of jigs and fixtures for simple components

UNIT I TOOL DESIGN **10**

Different tool materials: cemented carbides, coated carbides, cermets, ceramics and polycrystalline tool materials – compositions - properties of tool materials - Selection and treatments - Plastics as tooling materials - New tooling materials Design of single point turning and threading tools - Selection of tool holders and inserts for turning - Chip breakers - Design of twist drill and reamers.

UNIT II PRESS TOOL DESIGN **10**

Press working terminology - Presses and press accessories - Computation of capacities and tonnage requirements - Strip layout - Types of dies – Design and development of various types of cutting, forming, bending and drawing dies - Progressive dies, Combination dies and compound dies - Blank development for cylindrical and non cylindrical shells, Simple problems.

UNIT III DESIGN OF JIGS **10**

Principles of jigs and fixtures - Locating elements - Drill bushes - Different types of jigs - Plate, latch, channel, post, angle plate, turn over, and pot jigs - Automatic drill jigs, Design and development of jigs for given components.

IV DESIGN OF FIXTURES **10**

Design principles of fixtures - Design of fixtures for milling, boring. Design of fixture for assembly, inspection and welding. Design and development of fixtures for given components.

UNIT V TERM PROJECT **5**

Submission of an industrial report on observation training in Jigs, fixture and press tools. (A group comprising of 3 or 4 students should identify a component from an industry and should design jig and fixture or press tool as per the requirement).

TOTAL 45

TEXT BOOKS

1. Sadasivan, T. A., and Sarathy, D., *Cutting tools for Productive machining* , 1st edition, Widia (India) Ltd, Bangalore, 1999.
2. Donaldson, C., Lecain, G. H. and Goold, V. C., *Tool Design*, Tata McGraw Hill publishing company limited, New Delhi, 2002.
3. Edward G. Hoffman, *Jigs and Fixture design*, 2nd edition, Galgotia publication Pvt. Ltd., New Delhi, 1987.

REFERENCE

1. Hiram E. Grant, *Jigs and Fixtures - Non standard clamping device*, Tata McGraw Hill, New Delhi, 1971.
2. Prakash H. Joshi, *Press tool design and construction*, 1st edition, Wheeler Publishing, New Delhi, 2000.
3. Kempster, M. H. A., An *Introduction to Jig and tool design*, 3rd edition, ELBS, 1987.
4. Prakash H. Joshi, *Cutting tools*, 1st edition, Wheeler Publishing, New Delhi, 1997.
5. Prakash H. Joshi, *Tooling Data*, 1st edition, Wheeler Publishing, New Delhi, 2000.
6. ASTME, *Fundamentals of Tool design*, 11th Edition, Prentice Hall of India, New Delhi, 1987.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×					×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										

4	**Course Coordinator**	Mr. G. Murali

		L	T	P	C
ME0027	**FLEXIBLE MANUFACTURING SYSTEMS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To provide the knowledge about different manufacturing concepts like GT and FMS.

INSTRUCTIONAL OBJECTIVES

1. Study of different types of production
2. Knowledge of group technology(GT)
3. Introduction and need of FMS
4. Detailed study of flexible manufacturing cells and systems
5. FMS software

UNIT I PRODUCTION SYSTEMS **9**

Types of production-Job Shop, Batch and Mass production - Functions in manufacturing - Organization and information processing in manufacturing - Plant layout - Batch production – Work in progress inventory - Scheduling, problems.

UNIT II GROUP TECHNOLOGY **9**

Formation of part families - Part classification - Coding system optiz, Multi Class - Production flow analysis – Machine cells design - Clustering methods - Modern algorithms - Benefits of GT - System planning - Objective, guide line, system definition and sizing - Human resources - Objective, staffing, supervisor role.

UNIT III FLEXIBLE MANUFACTURING SYSTEMS **9**

Introduction – Evolution – Definition - Need for FMS - Need for Flexibility - Economic Justification of FMS-Application Criteria - Machine tool Selection and Layout - Computer control system - Data files – Reports - Planning the FMS - Analysis Methods for FMS - Benefits and limitations.

UNIT IV FLEXIBLE MANUFACTURING CELLS **9**

Introduction - Cell description and classifications - Unattended machining – Component handling and storage system - Cellular versus FMS – System - Simulation, Hardware configuration – Controllers - Communication networks - Lean production and agile manufacturing.

UNIT V FMS SOFTWARE **9**

Introduction - General Structure and requirements - Functional descriptions - Operational overview - Computer simulation - FMS installation – Objective - Acceptance testing - Performance goals – Expectations - Continued support.

TOTAL 45

TEXT BOOKS

1. William W. Luggen, *Flexible Manufacturing Cells and Systems*, Prentice Hall, New Jersey, 1991.
2. Mikell P. Groover, *Automation Production Systems &Computer Integrated manufacturing*, Prentice Hall of India, New Delhi, 1989.

REFERENCE BOOKS

1. David J. Parrish, Flexible Manufacturing, Butterworth-Heinemann, Newton, MA, USA, 1990.
2. Buffa, E. S., Modern Production and Operation Management, New York, 1985.
3. Jha, N.K. " Handbook of Flexible Manufacturing Systems ", Academic Press Inc., 1991.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
				×							×	
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
		X										
4	Course Coordinator	Mrs.A.Vijaya										

		L	T	P	C
ME0028	NON TRADITIONAL MACHINING TECHNIQUES	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To impart clear knowledge about different unconventional processes and the latest developments to the students.

INSTRUCTIONAL OBJECTIVES

To enable the students to understand the

1. Basic concepts of non traditional machining techniques
2. Factors influencing the processes and their applications

UNIT I INTRODUCTION **5**

Introduction to non traditional machining methods – Need for non - traditional machining - Sources of metal removal – Classification on the basis of energy sources – Parameters influencing selection of process.

UNIT II MECHANICAL ENERGY TECHNIQUES **12**

Abrasive Jet Machining (AJM): Operating principles – Equipment – Parameters influencing metal removal – Benefits – Applications – Advantages and Limitations.

Water Jet Machining (WJM): Operating principles – Equipment – Parameters influencing metal removal – Benefits – Applications – Advantages and limitations.

Ultra Sonic Machining (USM): Operating principles – Equipment and sub systems – Parameters influencing metal removal – Benefits and Applications – Advantages and limitations

UNIT III ELECTRICAL ENERGY TECHNIQUES **9**

Electro Chemical Machining (ECM): Operating principles – Equipment and sub systems – Parameters influencing metal removal – Benefits and applications – Advantages and limitations – Current developments in ECM.

Electro Chemical Grinding (ECG): Operating principles – Equipment and sub systems – Parameters influencing metal removal – Benefits – Applications – Advantages and limitations

UNIT IV THERMO ELECTRICAL ENERGY TECHNIQUES **10**

Electrical Discharge Machining (EDM) and Wire Cut Electrical Discharge Machining (WCEDM): Operating principles – Equipment and sub systems – Parameters influencing metal removal – Benefits – Applications – Advantages and limitations.

Electrical Discharge Grinding (EDG): Operating principles – Equipment and sub systems – Parameters influencing metal removal – Benefits – Applications – Advantages and limitations

UNIT V THERMAL ENERGY TECHNIQUES **9**

Operating principles – Equipment and sub systems – Parameters influencing metal removal – Benefits – Applications – Advantages and limitations of Electron beam machining (EBM), Plasma ARC Machining (PAM) and laser beam machining (LBM).

TOTAL 45

TEXT BOOKS

1. Mishra, P. K., *Non-Conventional Machining*, The Institution of Engineers (India), Text Book Series, New Delhi, 1997.
2. Garry F. Benedict, *Unconventional Machining Process*, Marcel Dekker Publication, New York, 1987.

REFERENCE BOOKS

1. Bennedict, G. F., *Non Tradtional Machining Techniques*, Marcel Decker, New York, 1990.
2. Sharma, P. C., *A Text book of Production Engineering*, New Delhi, 1995.
3. Pandey and Sha, *Modern Manufacturing Process*, Prentice Hall, New Jersey.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×							×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										
4	**Course Coordinator**	Mr.S.Shakthivel										

		L	**T**	**P**	**C**
ME0029	**FOUNDRY ENGINEERING**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To impart the students clear knowledge about foundry engineering.

INSTRUCTIONAL OBJECTIVES

To understand the Basic concepts of

1. patterns and pattern making
2. different methods of moulding, casting processes
3. modernization of foundry shop.

UNIT I PATTERNS AND PATTERN MAKING **8**

Introduction to foundry – Steps involved in casting, advantages, limitations and applications of casting processes. Pattern types, allowances for pattern - Pattern materials colour coding and storing of patterns.

UNIT II MOULDING **10**

Moulding methods and process – Materials, equipment moulding, Sand ingredients, Essential requirements - Sand preparation and control testing,Cores and core making.
Design considerations in casting gating and risering and directional solidification in castings.

UNIT III CASTING PROCESS **15**

Sand casting – Pressure die casting – Permanent mould casting – Centrifugal casting – Precision investment casting – Shell moulding – CO_2 moulding, continuous casting – Squeeze casting – Electroslag casting – Fettling and finishing – Defects in castings – Near Net Techniques.

UNIT IV MELTING, POURING AND TESTING **7**

Foundry remelting furnaces – Selection of furnaces – Crucibles oil fired furnaces – Electric furnaces – Cupola furnace, Calculation of cupola charges – Hot blast cupola – Degasification – Inoculation – Pouring equipment – Inspection of castings.

UNIT V MODERNIZATION AND MECHANIZATION IN FOUNDRY SHOP **5**

Need – Areas for mechanization – Typical lay out – Sand reclamation techniques – Material handling, Pollution control in foundry shop – Computers in castings.

TOTAL **45**

TEXT BOOKS

1. Banga, T. R. and Agarwal, R. L., *Foundry Engineering*, Khanna publishers, New Delhi, 1992.
2. Jain, P. L., *Principles of Foundry Technology*, Dhanpat Rai & sons, New Delhi, 1996.

REFERENCES

1. Taylor, H. F., Flemings, M. C. and Wulff, J., *Foundry Engineering*, Wiley Eastern Ltd., New Delhi, 1993.
2. Gupta, R. B., *Foundry Engineering*, Sathyaparkasam, New Delhi, 1989.
3. ASM Metals, *Hand Book on Castings*, Vol. 15, 14th Edition, 2002.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×							×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
		X										

4	Course Coordinator	Mr. M.R. Stalin John

		L	T	P	C
ME0041	COMBUSTION ENGINEERING	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To study the concepts of combustion of fuel and flames.

INSTRUCTIONAL OBJECTIVES

To familiarize

1. Chemistry of combustion.
2. Types of flames.
3. Combustion in Internal Combustion Engines.

UNIT I COMBUSTION OF FUELS **9**

Combustion equations - Theoretical air, excess air - Air fuel ratio, Equivalence ratio - Exhaust gas composition - Air fuel ratio from exhaust gas composition and heating value of fuels.

UNIT II THERMODYNAMICS OF COMBUSTION **9**

Thermo-chemistry, First law analysis of reacting systems - Adiabatic combustion temperature - Second law analysis of reacting systems - Criterion for chemical equilibrium - Equilibrium constant for gaseous mixtures - Evaluation of equilibrium composition - Chemical availability.

UNIT III KINETICS OF COMBUSTION **9**

Rates of reaction - Reaction order and molecularity complex reactions - Chain reactions - Arrhenius rate equation, Collection theory - Activated complex theory - Explosive and general oxidative characteristics of fuels.

UNIT IV FLAMES **9**

Laminar and turbulent flames - Premixed and diffusion flames - Burning velocity and its determination - Factors affecting burning velocity - Quenching, Flammability and ignition - Flame stabilization in open burners.

UNIT V ENGINE COMBUSTION **9**

Combustion in SI and CI engines - Stages of combustion in SI and CI engines, Normal combustion and abnormal combustion - Emissions from premixed combustion - Emission from non premixed combustion - Control of emissions

TOTAL 45

TEXT BOOKS

1. Stephen R. Turns, *An Introduction to Combustion concepts and applications*, 2nd Edition, McGraw Hill Book Company, Boston, 2000
2. Lewis, R.N., Pease and Taylor, H.S., *Combustion Process Vol. II*, Princeton University Jet Propulsion series, Princetons Univ. Press, New Jessely, 1959.

REFERENCE BOOKS

1. Irwin Glassman, *Combustion*, 3rd Edition, Academic Press, New York, 1996.
2. Sharma, S. P. and Chandramohan, *Fuels and Combustion*, Tata McGraw Hill Book Co., New Delhi, 1984.
3. Samir Sarkar, *Fuels and Combustion*, 2nd Edition, Orient Longman, Bombay, 1990.
4. Kuo, K. K., *Principles of Combustion*, John Wiley & Sons, New York, 1984.

5. Heywood, J. B., *Internal Combustion Engine Fundamentals*, 2nd Edition, McGraw Hill Book Co., New York, 1988.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	D	e	f	g	h	i	j	k
		×		×		×						×
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)		
										X		
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
						X						
4	Course Coordinator	Dr.M.Cheralathan										

		L	T	P	C
ME0042	GAS TURBINE TECHNOLOGY	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To familiarize various working principle of Gas Turbine Power plant.

INSTRUCTIONAL OBJECTIVES

1. To study basic equation of power cycles
2. To study flow through centrifugal compressor and axial flow compressor
3. To study flow through Turbines and combustion systems
4. To study flow through Performance predictions

UNIT I INTRODUCTION **9**

Open cycle single shaft and twin shaft multi speed arrangement – Closed cycle – Aircraft propulsion – Industrial application – Environmental issues - Future – Possibilities

UNIT II POWER CYCLES **9**

Ideal cycles method of accounting – Component losses – Design point performance calculations – Comparative performance of practical cycles – Combined cycle – Cognation schemes – Closed cycle - Gas turbine - Reheat – intercooling – Regenerator cycles.

UNIT III CENTRIFUGAL AND AXIAL FLOW COMPRESSORS **9**

Centrifugal compressor – Principle of operation – Work done – Pressure rise – The diffuser – Compressibility effects – Non dimensional quantities - Computerized design procedure. Axial flow compressor basic operation – Elementary theory – Factors effecting stage pressure ratio – Blockage in compressor annulus – Degree of reaction – Blade fixing details - Sealing materials – Material selection for compressor blades – Stage performance – Design and off design performance characteristics.

UNIT IV TURBINES AND COMBUSTION SYSTEMS **9**

Operation requirements, type of combustion – Factors affecting combustion process – Combustion chamber performance.Turbine construction – Performance – Impeller blade fixing – Cooling of turbine blades – Blade vibration – Protective coating – Gas turbine turbo chargers - Power expanders – Vortex theory – Estimation of stage performance.

UNIT V PERFORMANCE PREDICTIONS **9**

Prediction performance of gas turbines component characteristics – Off design operation – Equilibrium running of gas generator – Off design operation of free turbine – Methods of displacing of the equilibrium running line – Incorporation of variable pressure losses – Matching procedure for two spool engines – Principle of control systems.

TOTAL 45

TEXT BOOKS

1. Cohen–HEFC Rogers and Saravanamutto, H. W., *Gas turbine theory,* Long man scientific technical, Singapore, 1997.
2. Lefebvre.A.W., Gas *Turbine Propulsion,* McGraw Hill, New York, 1983.

REFERENCE BOOKS

1. Horlock J. H., *Axial flow turbine*, 4th Edition, Butterworth Publishers, London, 1966.
2. Gopalakrishnan, G. and Prithvi Raj D., *Treatise on Turbomachines,* Scitech Publications, Chennai, 2002.
3. Kerrebrock J.C., *Aircraft Engines and Gas Turbines*, Cambridge, Mass MIT Press, 1977.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**A**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×		×		×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Mr. P. Sudhakar										

		L	**T**	**P**	**C**
ME0043	**BOUNDARY LAYER THEORY**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To gain knowledge of boundary layer concepts of fluid.

INSTRUCTIONAL OBJECTIVES

1. To study basic governing equation of fluid flow
2. To study behavioral change of laminar boundary layer

3. To study behavioral change of turbulent boundary layer
4. To study behavioral change of compressible boundary layer

UNIT I INTRODUCTION **9**

Description of flow along a solid surface – Development of Boundary layer along a flat plate - Definition of Boundary layer thickness – Displacement thickness, momentum, energy thickness-Boundary layer at inlet length of pipes – Flow separation - Flow through diffuser – Motion pivot symmetrical and bluff obstacles - Form drag and skin friction – Turbulence in boundary layer – Sharp fall in drag coefficient - Hot wire and Laser – Doppler Anemometers.

UNIT II BASIC EQUATIONS OF FLUID FLOW **9**

Equation of continuity, momentum and energy applied to system and control volume – Concept of flow fields – Boundary conditions.

UNIT III LAMINAR BOUNDARY LAYER **9**

Simplified form of Boundary layer equation-Blasius solution for flat plate – Boundary layer temperature profiles for constant plate temperature – Faulkner Sknon wedge flow – Von - Karman integral method – Momentum equation – Energy equation - Application to flow past a flat plate and a circular cylinder – Dohlsausen method – Thermal boundary layer calculations – One parameter and two parameter integral methods.

UNIT IV TURBULENT BOUNDARY LAYER **9**

Two dimensional turbulent boundary layer equations – Integral relations – Eddy viscosity theories - Velocity profiles – The law of the wall – The law of the wake – Turbulent flow in pipes and channels – Turbulent boundary layer on a flat plate – Boundary layer with pressure gradient.

UNIT V COMPRESSIBLE BOUNDARY LAYER **9**

Compressible boundary layer equation – Recovery factor – Similarity solutions laminar supersonic cone rule - Shock - boundary layer interaction.

TOTAL 45

TEXT BOOKS

1. Schlichting, H., *Boundary layer Theory*, VI edition, McGraw Hill Publication, New York, 1991.
2. White, F. M., *Viscous Fluid Flow*, 2nd edition, McGraw Hill Publication, New York, 1991.

REFERENCE BOOKS

1. Reynolds, A. J., *Turbulent flow in Engineering*, John Wiley & sons, New York, 1980.
2. Anderson, J. D., *Fundamentals of Aerodynamics*, McGraw hill Book co., New York, 1985.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×		×		×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						

4	**Course Coordinator**	Mr. P. Sudhakar

		L	T	P	C
ME0044	**FUEL CELL TECHNOLOGY**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To introduce the technology of fuel cells and to familiarize with the research and developmental challenges in fuel cell technology.

INSTRUCTIONAL OBJECTIVES

At the end of the course, the student will be able to:

1. Understand the basic principles involved fuel cell operation,
2. Gain knowledge of various fuel cells and their specific operating principles,
3. Design simple fuel cell systems and
4. Get exposed to research and development challenges involved in various types of fuel cells.

UNIT I INTRODUCTION AND THERMODYNAMICS 9

Introduction: Basic operating principles – Historical highlights – Classification. **Thermodynamics:** Electrochemical energy conversion – Theoretical efficiency – Factors affecting electrochemical energy conversion

UNIT II ELECTRODE KINETICS 9

Electrode double layer – Electrolyte double layer – Double layer models (Helmoltz model, Gouy-Chapman Model, Stern model, Grahame model – Bockris, Devenathan and Muller model, and chemical models) – Solid metallic electrode – Semiconductor electrode – Specific adsorption – Zero potential.

UNIT III ALKALINE FUEL CELLS AND PHOSPHORIC ACID FUEL CELLS 9

Alkaline Fuel Cells: Working principle – Components – Modules and stacks – Performance characteristics (power density, space applications, atmospheric pressure cells) – Limitations and Research and Development challenges – System issues – Ammonia as fuel. **Phosphoric Acid Fuel Cells:** Cell reactions – Electrodes (stability of catalysts, electrode fabrication – fuel cell performance) – Stacks and systems.

UNIT IV SOLID OXIDE FUEL CELLS AND MOLTEN CARBONATE FUEL CELLS 9

Solid Oxide Fuel Cell: Principle of operation - Benefits and limitations – Cell components (electrolytes, zirconia systems, ceria based electrolytes, perovskite-based systems) – Cathode materials – Anode materials – Interconnects – Fuel reactions –Configurations and performance (tubular, monolithic, planar) – Environmental impact – Applications. **Molten Carbonate Fuel Cell:** General principle – Components (electrolyte and matrix, cathode and anode materials) – Electrode reactions – Life time

UNIT V DIRECT METHANOL FUEL CELLS AND PROTON EXCHANGE MEMBRANE FUEL CELLS 9

Direct Methanol Fuel Cells: Operating principle – Noble metal issue – Electro-oxidation of methanol (catalysts, oxygen electro-reduction, electrolyte, non-catalytic aspects) - Methanol crossover – Catalyst optimization – Vapor feed versus liquid feed cells. **Proton Exchange Membrane Fuel Cells:** Operating principle (membranes, electrodes and electrolysis, optimization of membrane and electrode assembly, impurities) – Technology development (single cell and stacks, composite plates) – Fuel processing – Modeling studies (membrane, electrode, membrane-electrode assembly, fuel cell, stack and system) – Technology development and applications.

TOTAL 45

TEXT BOOKS

1. Viswanathan, B. and Aulice Scibioh, M., *Fuel Cells Principles and Applications,* Universities Press (India) Pvt. Ltd., Hyderabad, 2006.
2. Hoogers, G. Edr., *Fuel Cell Technology Handbook,* CRC Press, Washington D.C., 2003.

REFERENCE BOOKS

1. Larminie, J. and Dicks, A., *Fuel Systems Explained,* John Wiley & Sons, Ltd., New York, 2001.
2. O'Hayre, R., Suk-Woncha, Whitney Colella, Prinz, F.B., Fuel Cell Fundamentals, John Wiley & Sons, New York,
2006.
3. Pukushpan, J.T., Stctanopoulon, A.G., Peng, H., Fuel Cell Power Systems, Springer, 2006.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×		×		×					×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Dr.M.Cheralathan										

		L	**T**	**P**	**C**
ME0045	**ELEMENTS OF SPACE TECHNOLOGY**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

This course is designed to provide a broad overview of the space technology with regard to rocket propulsion.

INSTRUCTIONAL OBJECTIVES

1. To develop a basic knowledge about the solar system and the earth's atmosphere.
2. To learn the different cases of satellite orbit transfer, different satellite injection errors

UNIT I BASIC CONCEPTS **9**

The solar system - Reference frames and coordinate systems - The celestial sphere -The ecliptic - Motion of vernal equinox - Sidireal time - Solar time - Standard time - The earth's atmosphere.

UNIT II THE GENERAL N-BODY PROBLEM **9**

The Many body problem - Lagrange - Jacobi identity - The circular restricted three body problem – Libration points - Relative Motion in the N-body problem - The two - body problem - Satellite orbits - Relations between position and time - Orbital elements.

UNIT III SATELLITE INJECTION & SATELLITE ORBIT PERTURBATIONS 9

General aspects of satellite injections - Satellite orbit transfer - Various cases - Orbit deviations due to injection errors - Special and general perturbations - Cowell's Method - Encke's method - Method of variations of orbital elements - General perturbations approach.

UNIT IV INTERPLANETARY TRAJECTORIES BALLISTIC MISSILE- TRAJECTORIES 9

Two-dimensional interplanetary trajectories - Fast interplanetary trajectories - Three dimensional interplanetary trajectories - Launch of interplanetary spacecraft - Trajectory about the target plant. The boost phase - The ballistic phase - Trajectory geometry - Optimal flights - Time of flight - Re-entry phase -The position of the impact point - Influence coefficients.

UNIT V MATERIALS FOR SPACECRAFT 9

Space environment - Peculiarities -Effect of space environment on the selection of materials of spacecraft.

TOTAL 45

TEXT BOOKS

1. Sutton, G. P., *Rocket Propulsion Elements*, 7th Edition, John Wiley & Sons, New York, 1993.
2. Van de Kamp, P., *Elements of Astromechanics*, 2nd Edition, Pitman, London, 1979.

REFERENCE BOOKS

1. Cornelisse, J.W., *Rocket Propulsion and Space Dynamics*, W.H. Freeman & Co., New York, 1984.
2. Parker, E. R., *Materials for Missiles and Spacecraft*, McGraw Hill Book Co., New York, 1982.
3. Rudolph . Meyer., *Elements of Space Technology,* Acadamic press, London, 1999.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×		×		×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Prof. L.R. G. Subramanian										

		L	**T**	**P**	**C**
ME0046	**ROCKET PROPULSION**	**3**	**0**	**0**	**3**
	Prerequisite				
	(First courses on Thermodynamics and Gas Dynamics)				

PURPOSE

To introduce the principles of rocket propulsion and teach simple design procedures.

INSTRUCTIONAL OBJECTIVES

At the end of the course, the student will be able to

1. Understand the basic principles involved in rocket propulsion,
2. Have knowledge of different types of rocket propulsion systems,
3. Learn the basic design principles involved and
4. Get exposed to research and development challenges.

UNIT I PERFORMANCE OF ROCKET VEHICLES **9**

Introduction – Static performance (thrust, specific impulse) – Vehicle acceleration (gravity, drag, single stage sounding rocket, burning time) – Chemical rockets (single stage rockets, multistage rockets)

UNIT II CHEMICAL ROCKET THRUST CHAMBERS **9**

Introduction – Performance characteristics (characteristic velocity, thrust coefficient) – Nozzles (conical nozzles, contoured nozzles, nozzle length, effects of friction, effect of back pressure, plug and expansion deflection nozzles) – Rocket heat transfer (regenerative cooling, convective heat transfer, radiative heat transfer, solid propellant rockets – heat sinks) - Liquid propellant rocket performance data.

UNIT III COMBUSTION AND EXPANSION **9**

Liquid propellants – Equilibrium composition – Non equilibrium expansion – Liquid propellant combustion chambers (fuel and oxidant injection, chamber length, chamber cross sectional area) – Solid propellants (burning rates, metal powders, two-phase flow) – Solid propellant combustion chambers (combustion pressure, burning stability, erosive burning) – Combustion instabilities.

UNIT IV TURBOMACHONERY FOR LIQUID ENGINES **9**

Feed systems and engine cycles (gas-pressure feed and turbopump feed, gas-generator cycle, staged-combustion, cycle, expander cycle, typical examples) – Centrifugal pumps – Inducers and axial pumps (inducers, cavitation, axial pumps) – Axial turbines.

UNIT V ELECTRICAL ROCKET PROPULSION **9**

Introduction – Electrostatic propellant accelerator – Bombardment ionization – The plane diode – Electrostatic thruster performance – The arcjet – Pulsed-magnetoplasma accelerators.

TOTAL **45**

TEXT BOOKS

1. Hill, P. and Peterson, C., *Mechanics and Thermodynamics of Propulsion,* 2nd Edition, Addison-Wesley Publishing Company, Singapore, pp. 467-685, 1992.
2. Oates G.C., *Aero Thermodynamics of Gas Turbines and Rocket Propulsion*, AIAA Educational Series,1988.

REFERENCE BOOKS

1. Sutton, G. P. and Biblarz, O., *Rocket Propulsion Elements,* 7th Edition, John Wiley & Sons, Inc., Singapore, 2001.
2. Barrere, M., Jaumotte, A., De Veubeke, B. F. and Vandenkerckhove, J., *Rocket Propulsion,* Elsevier Publishing Co., New York, 1960.
3. Zincow, *Aircraft and Missile Propulsion,*

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES**			**ENGINEERING SCIENCES AND**				**PROFESSIONAL SUBJECTS**	

			(B)	TECHNICAL ART (E)		(P)	
						X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing	Design	Thermal	Genaral		
				X			
4	Course Coordinator	Prof. L.R. G. Subramanian					

		L	T	P	C
ME0047	REFRIGERATION AND AIR CONDITIONING SYSTEMS	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

This course provides the knowledge about refrigeration and air conditioning system, and enables them to do simple design calculations and analysis of these systems.

INSTRUCTIONAL OBJECTIVES

At the end of the course, the student will be able to

1. Vapour compression and vapour absorption system operation,
2. Cycle analysis and method for improving performance,
3. Various components of refrigeration systems,
4. Design of air conditioning systems by cooling load calculations and
5. Application of refrigeration and air conditioning systems.

UNIT I VAPOUR COMPRESSION REFRIGERATION SYSTEMS 9

Review of thermodynamic principles of refrigeration-Simple vapour compression system – analysis-Method for improving COP – Multistage and multiple evaporator system - Cascade system – COP comparison.

UNIT II ABSORPTION REFRIGERATION SYSTEMS 9

Absorption refrigeration cycle - Water lithium bromide systems – ammonia absorption refrigeration system – COP calculation of single effect absorption system – Refrigeration absorbent combinations-comparison of absorption system with vapour compression systems

UNIT III REFRIGERATION EQUIPMENTS & CONTROL 9

Compressors – Condensers and Cooling towers-Evaporators-Expansion devices. **Refrigerants**: properties – selection of refrigerants-alternate refrigerants. Refrigeration plant controls- Testing and charging of refrigeration units.

UNIT IV DESIGN OF AIR CONDITIONING SYSTEMS 9

Different heat sources - Conduction and radiation load-occupants load - Equipment load-fresh air load-infiltration-air load- estimation of total load, bypass factor consideration-effective sensible heat factor (ESHF)-cooling coils and dehumidifier air washers.

UNIT V APPLICATION OF REFRIGERATION AND AIR CONDITIONING SYSTEMS 9

Preservation of different products-ice factory-dairy plant refrigeration systems-air conditioning of hotels and restaurants-air conditioning of theatres and auditorium-air conditioning of hospitals.

TOTAL 45

TEXT BOOKS

1. Arora, S. C. and Domkundwar, S., *A course in Refrigeration and Air conditioning*, Dhanpat Rai (P) Ltd., New Delhi, 1997.
2. Khurmi R.S., and Gupta, J. K., *A text book of Refrigeration and Air Conditioning*, Eurasia Publishing housing (P) Ltd, New Delhi, 2002

REFERENCE BOOKS

1. Manohar Prasad, *Refrigeration and Air conditioning*, New Age International (P) Ltd, New Delhi, 1999.
2. Stoecker, W. F. and Jones J. W., *Refrigeration and Air Conditioning*, Tata McGraw Hill, New Delhi, 1986.
3. Roy J. Dossat, *Principles of Refrigeration*, Pearson Education Asia, 4th edition, 2001.
4. Arora, C. P., *Refrigeration and Air Conditioning*, Tata McGraw Hill, New Delhi, 2002.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Mr.V.Rajasekar										

		L	**T**	**P**	**C**
ME0048	**ALTERNATIVE SOURCES OF ENERGY**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To familiarize the students with the concept of Biomass, Solar Energy, Wind Energy OTEC, Fuel cells and MHD systems.

INSTRUCTIONAL OBJECTIVES

At the end of the course, the student will be able to

1. To analyze the various renewable energy sources like wind, solar, biomass, Ocean energy, Fuel cells and MHD systems.
2. Exposure on biomass gasification and combustion, Theory of flat plate collectors, photo voltaic, thermal applications and limitations of solar energy are also provided.

UNIT I BIOMASS **9**

Biomass, sources of biomass - Fermentation, pyrolysis, gasification and combustion - Biogas, calorific value - Power generation, biogas plant design and operation. Thermo-chemical conversion of biomass - Energy balance, conversion to solid, liquid, and gaseous fuel.

UNIT II SOLAR ENERGY **9**

Solar radiation and its measurements. Flat plate collectors - Photovoltaic and thermal applications - Limitation of solar energy - Theory of flat plate collectors - Solar water heating, solar drying, solar stills, solar cooling and refrigeration.

UNIT III WIND ENERGY **9**

Basic principle of Wind energy conversion – Wind data and Energy Estimation – Site selection considerations – components of WECS – Advantages and disadvantages of WECS – Design consideration of horizontal axis Machines – Analysis of aerodynamic forces acting on the blade – Performance of wind Machines.

UNIT IV OCEAN ENERGY **9**

Ocean Thermal Energy Conversion - Wave and tidal energy - Availability, geographical distribution - Power generation using OTEC - Scope and economics - Geothermal energy, availability.

UNIT V FUEL CELL AND MHD SYSTEMS **9**

Fuel cell – principle – types – Advantages and disadvantages – conversion efficiency – application.
MHD - Power Generation Principle – Open cycle and Closed cycle – Design problems and developments – Advantages.

TOTAL 45

TEXT BOOKS

1. Rai, G. D., *Non-Conventional Energy Sources*, Khanna Publishers, 4th edition, New Delhi, 2005.
2. Wakil, M. M. EL., *Power Plant Technology*, McGraw Hill Book Company, New York, 1984.

REFERENCE BOOKS

1. Soreyson, B., *Renewable Energy*, Academic Press, 1989.
2. Twidell, J. W. and Weir, A. D., *Renewable Energy Resources*, ELBS Publication, 1986.
3. Martin Kaltschmitt, Wolfgang Streicher and Andreas Wiese, Renewable Energy: Technology, Economics and Environment, Springer, 2006.

Course designed by		**Department of Mechanical Engineering**									
1	**Student Outcome**	**a**	**b**	**C**	**D**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×					×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Mr.R.Senthil										

		L	**T**	**P**	**C**

ME0049	ENERGY ENGINEERING AND MANAGEMENT	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To familiarize the students with the concept of Energy Conservation.

INSTRUCTIONAL OBJECTIVES

At the end of the course, the student will get the knowledge about

1. Environment aspects of energy utilization.
2. Energy conservation and Energy Technologies.
3. Optimization of Energy use.

UNIT I ENERGY AND ENVIRONMENT **9**

Introduction -World energy consumption - Green house effect - Global warming -Renewable energy sources - Environment aspects utilization - Energy prizes - Energy policies.

UNIT II ENERGY CONSERVATION **9**

Energy conservation schemes – Industrial energy use – Energy surveying and auditing – Energy index – Energy cost – Cost index – Energy conservation in engineering and process industry, in thermal systems, in buildings.

UNIT III ENERGY TECHNOLOGIES **9**

Fuels and consumption –Boilers – Furnaces – Waste heat recovery systems – Heat pumps and refrigerators – Storage systems – Insulated pipe work systems – heat exchangers.

UNIT IV ENERGY MANAGEMENT **9**

Energy management principles – Energy resource management – Energy management information systems – Instrumentation and measurement – Computerized energy management.

UNIT V ECONOMICS AND FINANCE **9**

Costing techniques – Cost optimization – Optimal target investment schedule – Financial appraisal and profitability – Project management.

TOTAL **45**

TEXT BOOKS

1. Murphy, W. R. and Mc KAY, G., *Energy Management*, Butterworths, London, 1982.
2. Ray, D. A., *Industrial Energy Conservation*, Pergamon Press, 1981.

REFERENCES BOOKS

1. Callaghn, P. W. O., *Design and Management for Energy Conservation*, Pergamon Press, Oxford, 1981.
2. David Merick and Richard Marshal, *Energy, present and future options*, Vol. I and II, John Wiley & Sons, 1981.
3. Chaigier, N. A., *Energy Consumption and Environment*, McGraw-Hill, New York, 1981.
4. Ikken, P.A., Swart R. J. and Zwerves, S., *Climate and Energy*, 1989.
5. Jose Goldemberg, Thomas Johanson, B., Amulya, K. N., Reddy and Robert H. Williams, *Energy for a Sustainable World*, Wiley Eastern Ltd., 1990.

Course designed by		Department of Mechanical Engineering									
1	Student Outcome	a	b	c	D	e	f	g	h	i	j	k
				×	×	×			×		×	

2	Category	GENERAL (G)	BASIC SCIENCES (B)	ENGINEERING SCIENCES AND TECHNICAL ART (E)	PROFESSIONAL SUBJECTS (P)
					X

3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**	**Design**	**Thermal**	**Genaral**		
				X			
4	**Course Coordinator**	**Dr. G. Kasiraman**					

		L	T	P	C
ME0050	**DESIGN OF PUMPS AND TURBINES**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To introduce to the students the basic design aspects, working and operation principle of pumps and hydraulic turbines.

INSTRUCTIONAL OBJECTIVES

1. To do hydraulic design of simple radial flow pumps impellers.
2. To Know design principles of various hydraulic turbines.
3. To use computers in design and layout of impeller.
4. To appreciate effects of cavitation in hydraulic machines.
5. To solve problems in pumping systems.

UNIT I DESIGN OF HYDRAULIC IMPELLER PUMP **9**

Design of impellers using slip power method, design of inlet and outlet elements for pumps.

UNIT II TURBINE DESIGN **9**

Design principles of various turbine and draft tubes - Developments in bulb turbines and fully reversible axial flow turbines.

UNIT III COMPUTER AIDED DESIGN **9**

Introduction to computer aided design and layout of impellers

UNIT IV CAVITATION **9**

Cavitation in pumps and turbines. Its effect on performance, damage to various elements.

UNIT V APPLICATIONS **9**

Pumps application engineering – Performance and system characteristics – Regulation – Selection - Operation and maintenance - Pumping system economies - Pumps for different services.

TOTAL 45

TEXT BOOKS

1. Raabe, J., *Hydraulic Turbomachines*, VDI – Verlag, 1970.
2. Dixon S.L., *Fluid Mechanics and Thermodynamics of Turbomachinery,* 5th edition, Bulteruorth-Heinemann, U.K., 2005.
3. Shepherd, D.G., *Principles of Turbomachinery*, MacMillan, New York, 1956.

REFERENCE BOOKS

1. Igor J. Karassik and Terru McGuire, *Centrifugal pumps*, Chapman and Hall, International Thomson publishing, 2nd Edition, 1996.
2. Lazarkiewicz, S. and Troskolanski, T., *Impeller pumps*, 1967.

3. Stepanoff, A. J., *Centrifugal and axial flow pumps*, John Wiley & Sons, 1957.
4. Grigori Krivchenko, *Hydraulic machines turbines and pumps*, Lewis Publishers, CRC Press, 1994.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		×		×		×						
2	Category	GENERAL (G)		BASIC SCIENCES (B)			ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
						X						
4	Course Coordinator	Mr. P. Sudhakar										

		L	T	P	C
ME0051	COMPUTATIONAL FLUID DYNAMICS	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To impart knowledge about various computational methods for fluid flow and make.

INSTRUCTIONAL OBJECTIVES

1. Will be exposed to governing equations required for CFD and their mathematical behaviour.
2. Knows grid generation principles and types of grids required for different problems.
3. Made aware of solution techniques and computer codes.

UNIT I GOVERNING EQUATIONS **9**

Introduction – Various applications, Governing equations: – continuity, momentum, energy equations, boundary conditions – Conservation and Non conservation form.

UNIT II MATHEMATICAL BEHAVIOUR OF PARTIAL DIFFERENTIAL EQUATIONS **9**

Mathematical Behavior of Partial differential equations – Hyperbolic, Parabolic, Elliptic equations, Well posed problems, Difference equations, Explicit and Implicit approach, Errors and analysis of stability.

UNIT III GRID GENERATION **9**

Grid generation: general transformation of the equations, Metrices and Jacobians - Stretched and compressed grids - Boundary fitted coordinate systems - Modern developments in grid generation – Finite volume mesh generation, unstructured meshes and Cartesian meshes.

UNIT IV SOLUTION TECHNIQUES **9**

Simple CFD Techniques: The Lax-Wendroff Technique - MacCormmack's Techinique - The relaxation technique and its use with low speed invicid flow - Artificial viscosity - Alternating Direction Implicit (ADI) technique - Pressure correction techniques.

UNIT V EXAMPLES WITH DIFFERENT METHODS **9**

Solved problems- Finite Volume Techniques.

TOTAL **45**

TEXT BOOK

1. Anderson, J. D., *Computational Fluid Dynamics*, McGraw Hill International, New York, 1995.
2. Flecher,C.A., *Computational Techniques for Fluid Dynamics*, Vol. I to III, Springer-Verlag publications, Berlin, 1988.

REFERENCE BOOKS

1. Versteeg, H. K. and Malalasekera, W., *An Introduction to Computational Fluid Dynamics and the Finite Volume Method*, Addison Wesley Longmen Limited, 1995.
2. Patankar, S. V., *Numerical Heat Transfer and Fluid Flow*, Hemisphere Publishing Corporation, 1980.
3. Hirsch and Charles, *Numerical Computation of Internal and External Flow*, Vol. I and II, Wiley, New York, 1988.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×		×		×					×	×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**					**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Mr. P. Sudhakar										

		L	**T**	**P**	**C**
ME0052	**INTERNAL COMBUSTION ENGINES**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

On completion of this course, the students are expected to understand the fundamental principle, operation, and performance IC Engines.

INSTRUCTIONAL OBJECTIVES

The students will acquire knowledge of

1. Engine components, auxiliary systems and combustion aspects of SI and CI Engines
2. The latest developments in the field of IC engines like lean burn engines, MPFI, Catalytic converters.

UNIT I BASIC STUDY **10**

Internal Combustion Engine types and classification - SI and CI engines-components, function, operation and comparison - Two-stroke and Four-stroke engines – Description, comparison. Inlet and exhaust manifolds - Basic concepts of supercharging and scavenging - Power output of different types of engines – Efficiency – Specific fuel consumption – IMEP determination – Simple calculations – Performance characteristics – Heat balance calculations- application of IC engines.

UNIT II ENGINE AUXILIARY SYSTEMS **10**

Desirable air-fuel ratio for starting, warm-up, acceleration, idling and normal operation. Carburetors – Necessity and function, types. Gasoline injection system – MPFI.

Fuel injection system for diesel engines – Necessity and function, types, injection pump – Nozzle type. Basic study Lubrication system – Need, types, oil properties. Basic study of cooling system – Need, types, air and liquid cooling – Coolant and antifreeze solutions . Ignition system – Conventional and electronic types.

UNIT III COMBUSTION IN SI ENGINES **8**

Initiation of combustion– Flame velocities – Normal and abnormal combustion - Knocking in combustion – Pre-ignition – Knock and engine variables – Knock reduction – Features and design consideration of combustion chamber– Stratified charge and lean burn engines.

UNIT IV COMBUSTION IN CI ENGINES **8**

Various stages of combustion – Vaporization of fuel drops and spray formation – Air motion – Swirl – Squish – Delay period - Diesel knock – Factors influencing diesel knock – Features and design considerations of combustion

UNIT V ENGINE POLLUTION **9**

Atmospheric pollution from reciprocating engines – Formation of oxides of nitrogen, carbon monoxide, hydrocarbons, aldehydes, smoke, and particulates. Emission control techniques.

Exhaust gas analysis – Non dispersive infra red gas analyzer, gas chromatography, chemiluminescent analyser – Flame ionisation detector. Emission standards – National and international limits.

Total **45**

TEXT BOOKS

1. Ramalingam, K. K., *Internal Combustion Engines- Theory and practice*, Scitech publications India Pvt. Ltd., Chennai, 2000.
2. Ganesan, V., *Internal Combustion Engines*, Tata McGraw-Hill, New Delhi, 1994.

REFERNCE BOOKS

1. Heywood, J.B., *Internal Combustion Engine Fundamentals*, McGraw Hill International, New York, 1988.
2. Obert, E. F., *Internal Combustion Engines and Air Pollution*, Harper International Ltd., 1973.
3. Stone, R., *Introduction to Internal Combustion Engines*, Macmillan Press, 1999.
4. Mathur, M. L., and Sharma, R. P., *A course in Internal Combustion Engines*, Dhanpat Rai & Sons, New Delhi, 1993.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×					×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P'**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						

	category)						
4	**Course Coordinator**	Dr.M. Cheralathan					

		L	T	P	C
AE0012	**AUTOMOTIVE ELECTRONICS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To provide knowledge about application of electronics in Automobile engineering.

INSTRUCTIONAL OBJECTIVES

At the end of the course, students will be able to know

1. Fundamentals of automotive electronics
2. Sensors and actuators for various engine applications
3. Electronic fuel injection and ignition systems
4. Automobile control system
5. Electronics application to security and warning systems

UNIT I FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS 4

Current trend in Automobiles - Open loop and closed loop systems - Components for electronic engine management. - Electronic management of chassis system.

UNIT II SENSORS AND ACTUATORS 6

Introduction, basic sensor arrangement, types of sensors such as: - Oxygen sensors, crank angle position sensors - Fuel metering, vehicle speed sensor and detonation sensor - Altitude sensor, flow sensor. Throttle position sensors, solenoids, stepper motors, relays.

UNIT III ELECTRONIC FUEL INJECTION AND IGNITION SYSTEMS 15

Introduction - Feed back carburetor systems (FBC) - Throttle body injection and multi point fuel injection - Fuel injection systems - Injection system controls - Advantages of electronic ignition system - Types of solid-state ignition systems and their principle of operation - Contact less electronic ignition system - Electronic spark timing control.

UNIT IV DIGITAL ENGINE CONTROL SYSTEM 10

Open loop and closed loop control systems - Engine cranking and warm up control - Acceleration enrichment - Deceleration leaning and idle speed control - Distributor less ignition - Integrated engine control system - Exhaust emission control engineering.

UNIT V VEHICLE MOTION CONTROL AND STABILIZATION SYSTEMS 10

Vehicle motion control - Adaptive cruise control - Electronic transmission control - Vehicle stabilization system - Antilock braking system - Traction control system - Electronic stability program - Onboard diagnosis system.

TOTAL 45

TEXT BOOKS

1. William B. Riddens, *Understanding Automotive Electronics,* 5th Edition, Butterworth, Heinemann Woburn, 1998.
2. Tom Weather Jr. and Cland C. Hunter, *Automotive Computers and Control system,* Prentice Hall Inc., New Jersey.
3. BOSCH, *Automotive Handbook,* 6th Edition, Bentley publishers.

REFERENCE BOOKS

1. Young, A. P. and Griffths, L., *Automobile Electrical Equipment*, English Language Book Society and New Press.
2. Crouse, W. H., *Automobile Electrical equipment*, McGraw Hill Book Co. Inc., New York, 1955.
3. Robert N Brady, *Automotive Computers and Digital Instrumentation*, A Reston Book, Prentice Hall, Eagle Wood Cliffs, New Jersey, 1988.
4. Bechtold, *Understanding Automotive Electronics*, SAE, 1998.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×		×					×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
						X						
4	**Course Coordinator**	Dr. Leenus Jesu Martin										

		L	**T**	**P**	**C**
ME0061	**INDUSTRIAL ENGINEERING**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To provide the basic features of Industrial Engineering like work study, material handling, production planning control, wages and incentives etc.

INSTRUCTIONAL OBJECTIVES

After completion of this course the students will learn

1. The technique and procedures of work study
2. To analyse to planning procedures Human effectiveness
3. To know the methods of wage payment.

UNIT I WORK MEASUREMENT AND WORK STUDY 9

Work measurement, Techniques- Production study, Time study, Standard time-Rating factors- Work sampling, Work study, Techniques- Human factors- Work study and productivity-method study, Techniques and procedures- charging Techniques- Motion economy principles- SIMO chart-Ergonomics' and Industrial design.

UNIT II PLANT LAYOUT AND MATERIAL HANDLING 9

Plant location, site selection- Plant layout types, need, factors influencing the layout - Tools and techniques for developing layout, process chart, flow diagram, string diagram, Template and Scale models-Layout Planning procedure- Assembly line balancing. Material Handling, scope and importance- Types of material handling systems-factors influencing material handling- methods of material handling.

UNIT III WORK DESIGN ERGONIMICS, PRODUCTION & PRODUCTIVITY 9

Introduction to work design-Work design-for increased productivity, the work system design. Introduction to job design- Effective job design-Environmental factors, organizational factors & behavioral factors. Ergonomics -Objectives' system approach of ergonomic model-Man-machine system Production and productivity-Definition of production, function and type of production- Definition of productivity- Productivity measurement.

UNIT IV PRODUCTION PLANNING AND CONTROL **9**

Objectives of PPC- Functions of PPC- Aspects of product development and design- Process Planning-Principles of Standardization, specialization, Simplification-Group Technology- Optimum Batch size- ABC analysis- Value Engineering.

UNIT V WAGES AND INCENTIVES **9**

Wages and salary administration- Meaning principles- Techniques of wage fixation- Job evaluation-Merit rating- Methods of wage payment. Incentive scheme, Types, Advantages and disadvantages-Productivity base incentives, Case Example- Evaluation of incentive scheme.

TOTAL 45

TEXTBOOKS

l. Khanna O. P., *Industrial Engineering and Management*, Khanna publishers, New Delhi, 1999.
2. Samuel Ellen, *Elements of Production Planning and Control*, McMillan and Co., 1971.

REFERENCE BOOKS

1. Kumar B., *Industrial Engineering*, Khanna Publishers, New Delhi, 1998.
2. James M. Apple, *Principles of Layout and Material Handling*, Ronald press, 1997.
3. Maynard, H., *Industrial Engineering Hand Book*, McGraw Hill Book Co., New York, l999.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×	×	×	×		×			
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**					**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	Dr. B. K. Vinayagam										

		L	**T**	**P**	**C**
ME0062	**MATERIALS MANAGEMENT**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To expose the students to the different components and functions of material management

INSTRUCTIONAL OBJECTIVES

- Inventory control procedures
- Codification of materials
- Purchase policies and procedures

UNIT I INTRODUCTION 6

Objectives of materials-the function of purchasing and material management- significance of specifications-standardization-make or buy decision, buying process.

UNIT II MATERIALS PLANNING AND CONTROL 12

Material forecasting-selection inventory control-Spare parts management-Inventory systems-lead time analysis, administrative lead time, supplier lead time, transport lead time and inspection lead time-flow charting techniques to reduce various types of lead time- materials requirement planning- aggregate inventory management.

UNIT III STORAGE AND DISTRIBUTION 10

Codification of materials-storage design-stores layout-storage systems and equipment-stores preservation-stores procedures-stock valuation and verification-ware housing and distribution management.

UNIT IV PURCHASE FUNCTION 9

Purchasing policies and procedures-legal aspects of purchasing-selection of sources of supply-vendor evaluation and rating, vendor development-price, cost analysis.

UNIT V MATERIALS ACCOUNTING AND BUDGETING 8

Evaluation of materials management performance-Information systems and computer in materials management.

TOTAL 45

TEXT BOOK

1. Gopalakrishnan, P., *Purchasing And Materials Management*, Tata Mcgraw Hill, 1990.
2. Learnerr Lee Jr. And Donald .M.Dobbler, " Purchasing And Material Management ", Tata Mcgraw Hill,1996.

REFERENCE BOOKS:

1. Camer Lee and Donald M Dubbler, *Purchasing and Materials Management*, Text and cases, Tata McGraw Hill, 1997.
2. Mark, J. V., *Operations Management*, McGraw Hill Publishers,1984.
3. Westing, J. K., Fine, E.V. and Zone, C.T., *Purchasing Management Principles*, John Wiley & Sons, New York, 1986.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**H**	**i**	**j**	**k**
				×	×	×	×		×			
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				

4	Course Coordinator	Dr. B. K. Vinayagam

		L	T	P	C
ME0063	**HUMAN RELATIONS MANAGEMENT**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To expose the students to the functions of Human Relations Management.

INSTRUCTIONAL OBJECTIVES

After completion of this course the students will be able to

1. Understand the human relations
2. Understand the recruitment procedures
3. Acquire the knowledge of Career development and counseling.

UNIT I HUMAN RESOURCE DEVELOPMENT **10**

Meaning – Strategic framework for HRM and HRD – Vision, Mission and Values – Importance – Challenges to Organisations – HRD Functions - Roles of HRD Professionals - HRD Needs Assessment - HRD practices – Measures of HRD performance – Links to HR, Strategy and Business Goals – HRD Program Implementation and Evaluation – Recent trends – Strategic Capability , Bench Marking and HRD Audit.

UNIT II E-HRM **6**

e- Employee profile– e- selection and recruitment - Virtual learning and Orientation – e - training and development – e- Performance management and Compensation design – Development and Implementation of HRIS – Designing HR portals – Issues in employee privacy – Employee surveys online.

UNIT III CROSS CULTURAL HRM **7**

Domestic Vs International HRM - Cultural Dynamics - Culture Assessment - Cross Cultural Education and Training Programs – Leadership and Strategic HR Issues in International Assignments - Current challenges in Outsourcing, Cross border M and A- Repatriation etc. - Building Multicultural Organisations - International Compensation.

UNIT IV CAREER & COMPETENCY DEVELOPMENT **10**

Career Concepts – Roles – Career stages – Career planning and Process – Career development Models– Career Motivation and Enrichment –Managing Career plateaus- Designing Effective Career Development Systems – Competencies and Career Management – Competency Mapping Models – Equity and Competency based Compensation.

UNIT V EMPLOYEE COACHING AND COUNSELING **12**

Need for Coaching – Role of HR in coaching – Coaching and Performance – Skills for Effective Coaching – Coaching Effectiveness– Need for Counseling – Role of HR in Counseling - Components of Counseling Programs – Counseling Effectiveness – Employee Health and Welfare Programs – Work Stress – Sources - Consequences – Stress Management Techniques.- Eastern and Western Practices - Self Management and Emotional Intelligence.

TOTAL 45

TEXT BOOKS:

1. Jeffrey A Mello, *Strategic Human Resource Management*, Thomson, Singapore, Southwestern, 2003.
2. Randy L. Desimone, Jon M. Werner and David M. Marris, *Human Resource Development*, Thomson Southwestern, Singapore, 2002.

REFERENCE BOOKS:

1. Robert L. Mathis and John H. Jackson, *Human Resource Management*, Thomson Southwestern, Singapore, 2003.
2. Rosemary Harrison, *Employee Development*, University Press India Ltd., New Delhi, 2003.
3. Srinivas Kandula, *Human Resource Management in Practice*, Prentice Hall of India, New Delhi, 2004.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
					×	×	×	×	×	×		

2	Category	GENERAL (G)	BASIC SCIENCES (B)	ENGINEERING SCIENCES AND TECHNICAL ART (E)	PROFESSIONAL SUBJECTS (P)
					X

3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing	Design	Thermal	Genaral		
					X		

4	Course Coordinator	Dr. B. K. Vinayagam

		L	T	P	C
ME0064	ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

This course provides the basic knowledge on aspects of entrepreneurship and supports extended to entrepreneurs.

INSTRUCTIONAL OBJECTIVES

On completion of this course the student is expected to

1. Understand the broad spectrum of entrepreneurship.
2. Know about the prelims of setting up of a business unit.
3. Understand the purchasing and marketing basics of the business.
4. Aware of various supports extended by banks and institutions.

UNIT I ENTREPRENEURSHIP **9**

Historical perspective of entrepreneurship - Traits of Entrepreneurs - Types of Entrepreneurs – Intrerpreneur - Difference between entrepreneur and intrepreneur - entrepreneurship in Economic growth - Factors affecting entrepreneurial growth, Major motives influencing entrepreneur.

UNIT II BUSINESS **9**

Small Enterprises: - Definition Classification - Characteristics Web and e business - Ownership structure - Project formulation - Sources of information - Steps involved in setting up a business – Identifying, selecting a good business opportunity - Market survey and research - Techno economic feasibility assessment - Preliminary Project report – Project appraisal – Project implementation - Network analysis - Techniques of PERT/CPM

UNIT III FINANCING AND ACCOUNTING **9**

Sources of finance - Institutional Finance - Term loans - Capital structure - Management of working capital - Costing, Break even analysis – Taxation - Income Tax, Excise Duty - Sales Tax - Purchasing Policies and procedures - Methods of purchasing - Stores management - Book keeping

UNIT IV MARKETING & GROWTH STRATEGIES **9**

Principles of marketing - Assessment of market needs - Demand forecasting, Product life cycle - Sales promotion Strategies - Product mix – Advertising - Distribution Channels - Growth strategies – Expansion – Diversification - Joint venture, Merger - Sub-contracting

UNIT V INSTITUTIONAL SUPPORT TO ENTREPRENEURS **9**

Institutional support to entrepreneurs - Government policy for small scale industries - Institutions for entrepreneurial growth – Various schemes - Self Help Group - Sickness in industry – Causes - Steps for correction and rehabilitation

(Field work-Collection of information on schemes of Entrepreneurial Support and Presentation)

TOTAL 45

TEXT BOOKS

1. Khanka, S. S., *Entrepreneurial Development*, S.Chand and Co Ltd, New Delhi, 1999.
2. Philip Kotler, *Principles of Marketing*, Prentice Hall of India, 1995.
3. Lamer Lee and Donald W. Dobler, *Purchasing and Materials Management*, Tata McGraw Hill, 1996.

REFERENCE BOOKS

1. EDII–Faculty and External Experts, *A Hand Book of new Entrepreneurs*, Published by Entrepreneurship Development Institute of India, Ahmedabad, 1986.
2. Saravanavel, P., *Entrepreneurial Development*, Ess Pee Kay Publishing House, Chennai, 1997.
3. Gopalakrishnan, P., *Hand book of Materials Management*, Prentice Hall of India, 1996.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
					×	×	×	×	×	×		
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	Mr. G. Kasiraman										

		L	**T**	**P**	**C**
ME0065	**FACILITIES PLANNING**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

On completion of the course the students are expected to design facilities for an industry to meet specific requirements.

INSTRUCTIONAL OBJECTIVES

To familiarize the students with

1. Facilities planning process
2. The strategies adopted for designing a facility
3. Evaluate the existing facility and modify to meet the requirements

UNIT I INTRODUCTION **9**

Significance and objectives of facilities planning - Facilities planning process - Developing facilities planning strategies - Influence of product - Process and schedule design - Facilities design.

UNIT II REQUIREMENTS AND RELATIONSHIPS **9**

Department planning, activity relationship, flow – patterns - Planning and measuring - Space requirements - Personnel requirements - Employee-facility interface - Restrooms, food services, health services - Office facility planning.

UNIT III ALTERNATIVE CONCEPTS AND TECHNIQUES **9**

Material Handling: Principles and classification. - Designing material handling systems - Estimating material handling costs - Safety consideration.

Layout Planning Models: Basic layout types - Layout procedures - Algorithmic approaches - Pair-wise exchange method, graph based approaches – CRAFT, BLOCPLAN, LOGIC, MULTIPLE. Multi floor facility layout. Developing layout alternatives - Computer assisted layout planning – ALDEP, CORELAP, CRAFT - Commercial facility layout packages.

UNIT IV FACILITY DESIGN **9**

Facility design for various functions – Warehouse operation - Manufacturing systems - Services.

UNIT V EVALUATING, SELECTING AND MAINTAINING **9**

Facilities plan - Evaluating, selecting, preparing, presenting, implementing and maintaining.

Total **45**

TEXTBOOKS:

1. Tompkins J. A., White J. A., Bozer Y. A., and Tan Choco J. M. A., *Facilities Planning*, 3rd Edition, John Wiley & sons, India, 2003.
2. James M. Apple, *Principles of layout and material handling,* Ronald press, 1977.

REFRENCES:

1. Francis R. L., McGinnis L. F., and White J. A., *Facility Layout and Location: An analytical approach*, Prentice Hall, New Jersey, 1992.
2. Gupta and Patel, *Work study,* Khanna Publishers, New Delhi.
3. Kanna O.P, *Industrial Engineering and management,* Khanna Publishers, New Delhi.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×	×	×	×		×			
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				

	professional courses only, i.e 'under P' category)				**X**		
4	**Course Coordinator**	Prof. K. Shanmugam					

		L	**T**	**P**	**C**
ME0066	**INDUSTRIAL SAFETY AND ENVIRONMENT**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

On completion of the course the student will be familiarized with the safety issues in design, handling and industrial environment.

OBJECTIVES

1. The students will be able to conduct basic safety inspections using strategies that they have developed.
2. The students will be able to identify and demonstrate a working knowledge of the domain of occupation health and safety.
3. The students will be able to create a document addressing the principles for developing and implementing a successful occupational health and safety program and evaluation of a work site.

UNIT I ACCIDENT PREVENTION **9**

Definitions and theories.- Accident – Injury – Unsafe act – Unsafe condition – Dangerous occurrence –Theories and principles of accident causation – Cost of accidents – Accident reporting and investigations – Safety committees – Need – Types – Advantages. Safety education and training - Importance - Various training methods – Accident prevention – Motivating factors – Safety suggestion schemes. Safety performance – Definitions connected with measuring safety performance as per Indian and International standards .

UNIT II SAFETY IN MATERIAL HANDLING **9**

General safety consideration in material handling - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears – Prime movers.Ergonomic consideration in material handling, design, installation, operation and maintenance of conveying equipments, hoisting, traveling and slewing mechanisms. Selection, operation and maintenance of industrial trucks – Mobile cranes – Tower crane.

UNIT III SAFETY IN CHEMICAL INDUSTRIES **9**

Safety in the design process of chemical plants - Safety in operational and maintenance – Exposure of personnel - Operational activities and hazards – Safety in storage and handling of chemicals and gases – Hazards during transportation – Pipeline transport – Safety in chemical laboratories. Specific safety consideration for cement, paper, pharmaceutical, petroleum, petro - chemical, rubber, fertilizer and distilleries.

UNIT IV ENVIRONMENTAL IMPACT ASSESSMENT **9**

Evolution of EIA – Concepts – Methodologies – Screening – Scoping – Checklist - Rapid and Comprehensive EIA – Legislative and environmental clearance procedure in India – Prediction tools for EIA. - Assesment of Impact – Air – Water – Soil – Noise- Biological. Socio cultural environment – Public participation – Resettlement and Rehabilitation. - Documentation of EIA .

UNIT V REGULATIONS FOR HEALTH, SAFETY AND ENVIRONMENT **9**

Factories act and rules; - Indian explosive act - Gas cylinder rules - Environmental pollution act - Indian petroleum act and rules - Oil industry safety directorate (OISD) - Indian Electricity act and rules. - Mines act and rules - Indian motor vehicles act and rules.

TOTAL **45**

TEXT BOOKS

1. Handlin, W., *Industrial Hand Book*, McGraw-Hill, 2000.
2. Anton, T. J., *Occupational safety and health management*, (2nd Edition). New York, McGraw Hill, 1989.

REFERENCE BOOKS

1. Heinrich, H. W., *Industrial Accident Prevention*, McGraw-Hill, 1980.
2. Rudenko, N., *Material Handling Equipments*, Mir Publishers, Moscow, 1981.
3. Lees, F. P., *Loss Prevention in Process Industries*, Butterworths, NewDelhi, 1986.
4. Canter, R. L., *Environmental Impact Assessment*, McGraw Hill.
5. IS CODES: IS 5903, IS 807, IS 2760, IS 14469, IS 13367-1, IS 5324, IS 7167, IS 7155, IS 1800.1, IS 3521 of
Oil Industry Safety Directorate, Govt. of India.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
				×	×	×	×	×	×			
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	Prof. K. Shanmugam										

		L	**T**	**P**	**C**
ME0067	**SUPPLY CHAIN MANAGEMENT**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To expose the students to the logistics approaches of supply chain management.

INSTRUCTIONAL OBJECTIVES

After completion of this course the students will be able to

1. Understand the role of logistics.
2. Understand the phases of supply chain
3. Understand the models and activities of SCM

UNIT I INTRODUCTION TO LOGISTICS **9**

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain – a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN **9**

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes – Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS **9**

Strategy and structure – Factors of supply chain – Manufacturing strategy stages - Supply chain progress – Model for competing through supply chain management – PLC grid, supply chain redesign – Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES **9**

Structuring the SC, SC and new products, functional roles in SC - SC design frame- work - Collaborative product commerce (CPC)

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM **9**

The management task - Logistics organization - The logistics information systems – Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. – Case study, ERP Software's

TOTAL 45

TEXT BOOKS

1. Shari, P. B. and Lassen, T. S., *Managing the global supply chain* , Viva books, New Delhi, 2000.
2. Ayers, J. B., *Hand book of supply chain management*, The St. Lencie press, 2000.

REFERENCE BOOKS

1. Nicolas, J. N., *Competitive manufacturing management – continuous improvement, Lean production, customer focused quality*, McGrawHill, New York, 1998.
2. Steudel, H. J. and Desruelle, P., *Manufacturing in the nineteen – How to become a mean, lean and world class competitor*, Van No strand Reinhold, New York, 1992.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
					×	×						
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**			**PROFESSIONAL SUBJECTS (P)**			
									X			
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	Mr. T. Rajasekaran, Mr. S. Prabhu										

		L	**T**	**P**	**C**
ME0068	**TQM AND RELIABILITY ENGINEERING**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To provide knowledge about Total Quality Management (TQM), TQM tools and techniques applied to Manufacturing and also about reliability and maintainability of different systems.

INSTRUCTIONAL OBJECTIVES

At the end of the course students will be able to know

1. Meaning of TQM and Theories about TQM
2. Planning and manufacturing for quality its tools and techniques
3. Human involvement to improve quality and the development and transformation due to such involvement.
4. About failure models, component reliability & system reliability
5. About mean down time, maintainability of systems & condition monitoring.

UNIT I BASIC CONCEPTS **9**

Evolution of total quality Management - Definition of quality - Comparison between traditional approach and TQM, Deming – Crosby – Juran - Taguchi, Ishikawa theories - Quality costs - Product quality Vs Service quality Strategic planning - Goal setting - Steps involved in strategic planning - TQM implementation.

UNIT II TQM PRINCIPLES & BASIC TOOL **9**

Customer Satisfaction – Types of customers, customer supplier chain, Customer perception of quality customer feed back - Customer complaints - Customer retention - Service quality.

Employee involvement – Employee motivation - Maslow's hierarchy of needs - Herzberg theory - Empowerment and team work.

Basic Tools: Introduction to seven basic tools – Check sheets, histograms - Control charts, Pareto diagram - Cause and effect diagram – Stratification - Scatter diagrams.

UNIT III NEW SEVEN MANAGEMENT TOOLS & ADVANCED TOOLS **9**

Affinity diagram - Relations diagram - Tree diagram - Matrix diagram - Matrix data analysis diagram - Process decision program chart - Arrow diagram.

Advanced QC tools: Advanced QC tools like QFD - Root cause analysis - Taguchi method - Mistake proofing (poka-yoke) - Failure mode and effects analysis (FMEAs), failure mode and effects criticality analysis (FMECAs) and Fault tree analysis (FTAs) etc. - Quality Management Systems.

UNIT IV RELIABILITY **9**

Definition - Probabilistic nature of failures - Mean failure rate - Meantime between failures - Hazard rate - Hazard models, Weibull model - System reliability improvement – Redundancy – Series - Parallel and Mixed configurations.

UNIT V MAINTAINABILITY **9**

Introduction - Choice of maintenance strategy - Mean time- to repair (MTTR) - Factors contributing to Mean Down Time (MDT) - Fault diagnosis, and routine testing for unrevealed faults - Factors contributing to Mean Maintenance Time - (MMT) on condition maintenance - Periodic condition monitoring - Continuous condition monitoring - Economics of maintenance.

TOTAL **45**

TEXT BOOKS

1. Joel E. Rose, *Total Quality Management*, 2nd Edition, Kogan Page Ltd., USA 1993.
2. Srinath, L. S., *Reliability Engineering*, Affiliated East West Press, New Delhi 1995.

REFERENCE BOOKS

1. Balagurusamy, E., *Reliability Engineering* Tata McGraw Hill publishing Co., New Delhi, 1984.
2. Greg Bound, et.al, *Beyond Total Quality Management towards the emerging paradigm,* McGraw Hill Inc., 1994
3. Zeiri, *Total Quality Management for Engineers,* Wood Head Publishers, 1991.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		×			×				×			
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)				PROFESSIONAL SUBJECTS (P)		
										X		
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
								X				
4	Course Coordinator	Mr. T. Rajasekaran										

		L	T	P	C
ME0069	MARKETING AND SALES MANAGEMENT	3	0	0	3
	Prerequisite				

PURPOSE

The students will be exposed to the hardcore and advance concepts of both marketing and sales management

INSTRUCTIONAL OBJECTIVES

On completion of the course the students will get a good understanding of

1. Marketing management
2. Customer behavior
3. Sales management

UNIT I INTRODUCTION TO MARKETING 9

Market - definition, types - Kinds of goods, marketing role, characteristics - Marketing interface with other functional areas - Marketing management forces.

UNIT II UNDERSTANDING CONSUMER BEHAVIOUR 9

Consumer values, buyer behaviour - influencing factors, models - Consumer and industrial buyers-identifying target customers - market segmentation - positioning

UNIT III MARKETING MIX ELEMENTS 9

Marketing mix- **Product:** – What is product – Consumer and industrial products – New product development – Design – Branding - Packaging-labeling - Product life cycle - Sales forecasting and demand estimation – **Price:** Pricing – **Place:** Nature of distribution channel - Channel design decisions – Retailing – wholesaling. **Promotion:** Advertising and personal selling - Direct selling

UNIT IV SALES MANAGEMENT 9

Marketing management Vs. Sales management - Sales management and business enterprise - The role of personal selling - Skills for successful sales persons – Designing the sales force strategy and structure – Recruitment – selection – training – Compensation - Motivation of sales people.

UNIT V CURRENT TRENDS IN MARKETING 9

Information technology and its impact in marketing decisions – e – commerce - Multilevel marketing - Consumer protection: awareness of consumer rights, laws and consumerism

Total 45

TEXT BOOKS

1. Kotler, P. and Armstrong, *Principles of Marketing*, 11th edition, Prentice Hall of India.
2. Zikmund d' Amico, *Marketing,* South Western, Thomson Learning, 2000

REFERENCES

1. Still, R. R., Cundiff, E. W., and Govoni, N.A.P., *Sales Management*, Prentice Hall of India.
2. Sherlekar, S. A., *Marketing Management*, 3rd Edition, Macmillan India,
3. Michael R Czinkota and Masaki Kotabe, *Marketing Management,* Vikas Thomson Learning, 2001.

Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
					×		×	×	×		×	
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
											X	
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	**Mr. G. Kasiraman**										

		L	**T**	**P**	**C**
MH0307	**PLC AND DATA ACQUISITION SYSTEMS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To provide students the fundamentals of PLC and Data acquisition system

INSTRUCTIONAL OBJECTIVES

On completion of the course the students will be able to

1. Understand the basic of data conversion and data acquisition
2. Understand the fundamental of PLC.

UNIT I COMPUTER CONTROL-INTRODUCTION 9

Need of computer in a control system - Functional block diagram of a computer control system - Data loggers - Supervisory computer control - Direct digital control - Digital control interfacing - SCADA.(Elementary treatment only).

UNIT II DATA CONVERTERS 9

DACs-Basic DAC Techniques-Weighted Resistor, R-2R Ladder and Inverted R-2R ladder type DACs- ADCs – Parallel ADC, Dual slope ADC, Successive approximation ADC-Comparison of A/D conversion techniques-DAC/ADC specifications - Typical IC's for DAC, ADC – Isolation amplifiers.

UNIT III DATA ACQUISITION SYSTEMS **9**

Sampling theorem – Sampling and digitizing – Aliasing – Sample and hold circuit – Practical implementation of sampling and digitizing – Definition, design and need for data acquisition systems – Interfacing ADC and DAC with Microprocessor / Multiplexer - Multiplexed channel operation –Microprocessor/PC based acquisition systems.

UNIT IV PLC **9**

Evolution of PLCs – Sequential and programmable controllers – Architecture- Programming of PLC – Relay logic – Ladder logic – Gates, Flip flops and Timers.

UNIT V COMMUNICATION IN PLC's **9**

Requirement of communication networks of PLC – connecting PLC to computer – Interlocks and alarms - Case study of Tank level control system and Sequential switching of motors.

TOTAL 45

TEXT BOOKS

1. Petrezeulla, *Programmable Controllers*, McGraw Hill, 1989.
2. Hughes, T., *Programmable Logic Controllers*, ISA Press, 1989.

REFERENCE BOOKS

1. Clayton, G. B., *Data Converters*, The Mac Millian Press Ltd., 1982.
2. Curtis D. Johnson, *Process Control Instrumentation Tech*, 8th Edition, Prentice Hall, June 2005.
3. Roy Choudhury, D. and Shail B. Jain, *Linear Integrated circuits*, New age International Pvt .Ltd., 2003.

Course designed by		**Department of Instrumentation and Control Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×										×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	Mrs. K. Ramya										

		L	**T**	**P**	**C**
IC0461	**INSTRUMENTATION AND CONTROL**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To enable the students to understand the fundamentals of instrumentation and control available for monitoring/measuring in domestic / industrial applications.

INSTRUCTIONAL OBJECTIVES

At the conclusion of this course, the students will be able to:

1. To learn fundamentals of various types of Transducers.
2. To acquire basic understanding of principle & working of Transducers.
3. To Understand the methods to analyze the stability of systems from transfer function forms.

UNIT I MEASUREMENT OF FORCE, TORQUE VELOCITY **9**

Electric balance – Different types of load cells – Magnets – Elastics load cell – Strain gauge load cell – Different methods of torque measurement - Strain gauge - Relative regular twist- Speed measurement – Revolution counter – Capacitive tacho – Drag up type tacho – D.C and A.C. tacho generators – Stroboscope.

UNIT II MEASUREMENT OF ACCELERATION, VIBRATION AND DENSITY **9**

Accelerometers – LVDT, piezo-electric, strain gauge and variable reluctance type accelerometers – Mechanical type vibration instruments - Seismic instruments as an accelerometer and vibrometer – Calibration of vibration pick ups – Units of density - Specific gravity and viscosity used in industries – Pressure head type densitometer – Float type densitometer – Ultrasonic densitometer

UNIT III MEASUREMENT OF PRESSURE &TEMPERATURE **9**

Units of pressure – Manometers – Different types – Elastic type pressure gauges – Bourdon tube bellows – Diaphragms – Electrical methods – Elastic elements with LVDT and strain gauges – Measurement of vacuum – Different types- McLeod gauge – Testing and calibration of pressure gauges – Dead weight tester. Bimetallic thermometers – Electrical methods of temperature measurement – RTDs and their - Thermocouples, Pyrometers – Optical pyrometers – Two colour radiation pyrometer.

UNIT IV TRANSFER FUNCTIONS **9**

Definitions, Transfer function – Mathematical modeling of mechanical (translation and rotational), electrical systems- Mechanical - Electrical analogies – Block Diagram reduction technique and Signal flow graphs.

UNIT V RESPONSE AND STABILITY ANALYSIS **9**

Time response of first order and Second order systems - Concept of stability - Necessary conditions for stability - Routh Stability criterion - Polar and Bode plots – Simple Problems.

TOTAL

45

TEXT BOOKS

1. Ernest O. Doebelin, *Measurement systems Application and Design*, International Student Edition, IV Edition, McGraw-Hill Book Company, 1998.
2. Jain, R. K., *Mechanical and Industrial Measurements*, Khanna Publishers, New Delhi, 1999.
3. Katsuhiko Ogata, *Modern Control Engineering* 2nd ed., Prentice Hall of India, New Delhi, 1995.

REFERENCE BOOKS

1. Patranabis, D., *Principles of Industrial Instrumentation*, Tata McGraw-Hill Publishing Ltd., New Delhi, 1999.
2. Sawhney, A. K., *A course in Electrical and Electronic Measurement and Instrumentation* – Dhanpat Rai and Sons, New Delhi, 1999.
3. Nakra, B.C. and Chaudary, K. K., *Instrumentation Measurement and Analysis*, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1985.
4. Benjamin C Kuo, *Automatic Control System*, 7th edition, Prentice Hall of India, New Delhi, 1993.

Course designed by		Department of Mechanical Engineering										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		×		×	×							×
2	Category	GENERAL (G)		BASIC SCIENCES (B)		ENGINEERING SCIENCES AND TECHNICAL ART (E)					PROFESSIONAL SUBJECTS (P)	
											X	
3	Broad area (for professional courses only, i.e 'under P' category)	Manufacturing		Design		Thermal		Genaral				
								X				
4	Course Coordinator	Mrs. K. Ramya										

		L	T	P	C
IC0464	MICROPROCESSOR BASED SYSTEM DESIGN	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

This course aims at introducing the need of microcontroller 8 bits and 16 bits in a device/ instrument development.

INSTRUCTIONAL OBJECTIVES

On completion of the course the student will be able to

1. Understand the need of Micro-controller family.
2. Develop the assembly level programs based on Intel 8083, 8096 & PIC microcontrollers.
3. Design the detailed hardware circuits for the given application.
4. Identify the need for I/O and memory expansion methods for an application.

UNIT I MICROPROCESSOR **9**

Need for microprocessor based system design – Design cycle – Dimensions of the design problem – Hardware design and software design – System integration.

Structure and Characteristics: 8253 Timer / Counter 8259 interrupt controller – 8279 keyboard / display controller – 6845 CRT controller 8237 DMA controller – 8272 diskette controller.

UNIT II INPUT AND OUTPUT ALGORITHMIC PROCESSES **9**

I/O control – I/O timing – Data buffering with FIFOS – Keyboards and switches – Remote instrument control – Self test hardware. Keyboard parsing – Real time programming – Self test algorithm. Multiplication and division algorithms.

UNIT III TROUBLESHOOTING SYSTEMS – LOGIC ANALYSERS **9**

Logic state analysers, Logic timing analysers - Display modes - Logic analysers features – Signature analysis - Error detection using signature analysis. - Development systems: Basic features – software development aids – Development system architecture – Emulators, system software – Assembler, linker, loader.

UNIT IV 8086 /8088 BASED MULTIPROCESSING SYSTEM **9**

Review of architecture and instruction set of 8086 Processor - Coprocessor configuration, closely coupled - Configurations, loosely coupled configurations – 8087 coprocessor: Architecture, instruction set – 8089 I/O processor.

UNIT V SYSTEM DESIGN APPLICATIONS **9**

LCR meter – PID controller – DC motor speed control – Digital weighing machine – Temperature control – Controller for a washing machine.

TOTAL 45

TEXT BOOKS:

1. John B. Peatman, *Microcomputer Based Interfacing*, McGraw Hill, 1988.
2. Douglass V. Hall, *Microprocessor and Interfacing*, McGraw Hill, 1987.

REFERENCE BOOKS

1. Williams, G. B., *Troubleshooting on Microprocessor Based Systems*, Pergamon Press 1984.
2. Yu-Cheng Liu and Glenn A. Gibson, *Microcomputer systems, The 8086/8088 family*, Second edition, Prentice Hall of India, 1990.
3. Ramesh S. Gaonkar, *Microprocessor Architecture programming and applications with 8085,* Fourth edition, Penram International publications, 2000.

Course designed by		**Department of Instrumentation and Control Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×		×	×							×
2	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**		**ENGINEERING SCIENCES AND TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**		
										X		
3	**Broad area (for professional courses only, i.e 'under P' category)**	**Manufacturing**		**Design**		**Thermal**		**Genaral**				
								X				
4	**Course Coordinator**	**Mrs. K. Ramya**										