

	<ol style="list-style-type: none"> Pyramid Discussion PNI Seminar Talk and Power Point Presentation <p>UNIT III: Professional Communication:</p> <ol style="list-style-type: none"> Self Affirmation Advanced Composition including Official letters and e-mail Resume Preparation Elements of Non-Verbal Communication <p>UNIT IV: Life Skills and Vocabulary for Competitive Examinations:</p> <ol style="list-style-type: none"> Select Life Skills(50) Select Logics, Isms, Phobias and Manias (25 each) Sentence Completion(50 items) Fundamentals of Syllogisms
Text books and Reference books	<p>Text Books:</p> <ol style="list-style-type: none"> Martin Cutts, Oxford Guide to Plain English, 7th Impression, OUP, 2011 Exercises in Spoken English, Prepared by Department of Phonetics and Spoken English, CIEFL, OUP, 21st Impression, 2003 <p>Reference Books:</p> <ol style="list-style-type: none"> Stephen R Covey, The 7 Habits of Highly Effective people, II edition, (Pocket Books) Simon & Schuster UK Ltd, 2004 Martin Cutts, Oxford Guide to Plain English, 7th Impression, OUP, 2011 Deborah. J. Bennett, Logic made easy: How to know when Language Deceives you, I edition(Reprint), 2005 Eclectic Learning Material offered by the Department
E-resources and other digital material	<ol style="list-style-type: none"> ODII Language Learner's Software, 27-6-2012 Orell Techno Systems Visionet Spears Digital Language Lab software Advance Pro , 28-01-2015 www.natcorp.ox.ac.uk, British National Corpus, XML edition 2007.

MECHANICAL ENGINEERING SYLLABUS B. Tech. First and Second Year



Department of Mechanical Engineering
(B. Tech. ME Programme Accredited by NBA)

**VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE**

(An Autonomous, ISO 9001:2008 Certified Institution)
(Approved by AICTE, Accredited by NAAC with 'A' Grade, Affiliated to JNTUK, Kakinada)
(Sponsored by Siddhartha Academy of General & Technical Education)
Kanuru, Vijayawada
Andhra Pradesh - 520007, INDIA.
www.vrsiddhartha.ac.in

PROGRAMME OUTCOMES

- a. An ability to apply the knowledge of mathematics, science and engineering fundamentals
- b. An ability to conduct Investigations using design of experiments, analysis and interpretation of data to arrive at valid conclusions
- c. An ability to design mechanical engineering components and processes within economic, environmental, ethical and manufacturability constraints
- d. An ability to function effectively in multidisciplinary teams
- e. An ability to identify, formulate, analyse and solve Mechanical Engineering problems
- f. An ability to understand professional, ethical and social responsibility
- g. An ability to communicate effectively through written reports or oral presentations.
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. An ability to recognize the need and to engage in independent and life-long learning.
- j. A knowledge of contemporary issues
- k. An ability to use the appropriate techniques and modern engineering tools necessary for engineering practice
- l. An ability to apply the principles of management to manage projects Multidisciplinary environments

14HS 1453 –COMMUNICATION SKILLS LAB

Course Category:	Programme Core	Credits:	2
Course Type:	Lab	Lecture - Tutorial - Practice:	0 - 0 - 2
Prerequisites:	Technical English & Communication Skills -14HS1204	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Be proficient in pronunciation of speech sounds including accentuation.											
	CO2	Enhance the awareness of the elements of listening comprehension.											
	CO3	Develop the abilities of rational argumentation and skills of public speaking.											
	CO4	Be aware of the elements of professional communication											
	CO5	Be exposed to the items of various competitive exams.											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1							H	H	M			L
	CO2		M		H	M	M	H	H	M	H		M
	CO3	H	H	M	H		H	H	M	M	H	L	H
	CO4	M	M	M	H	L	H	H	H	H	H	L	H
	(L – Low, M- Medium, H – High)	CO5		M	M	M	M	H	H	L	H	H	L
Course Content	UNIT:I : Elements of Spoken Expression and processes of Listening comprehension: 1. Speech Mechanism 2. Articulation of vowels and consonants 3. Patterns of Accentuation 4. Types and processes of Listening comprehension UNIT II: Polemics and Public Speaking: 1. Group Discussion												

	4. Common emitter configuration 5. Implementation of the given Boolean function using logic gates in both SOP and POS form. 6. Verification of combinational circuits(Half adder, full adder, half subtractor, full subtractor). Note: Any 5 experiments must be completed from Electrical lab and 5 experiments from Electronics lab
Text books and Reference books	--
E-resources and other digital material	--

Velagapudi Ramakrishna
Siddhartha Engineering College: Vijayawada - 7
Scheme of Instruction and Examination – VR14
Department of Mechanical Engineering

First Year – Semester I

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14MA1101	Linear Algebra and Differential Equations	4	1		4	30	70	100
2	14CH1102	Engineering Chemistry	3	1		3	30	70	100
3	14CS1103	Introduction to Computing	2			2	30	70	100
4	14CE1104	Basics of Civil Engineering	2			2	30	70	100
5	14HS1105	Professional Ethics	2			2	30	70	100
6	14ME1106	Basics of Mechanical Engineering	2			2	30	70	100
7	14ME1107	Mechanics for Engineers	4	1		4	30	70	100
8	14CH1151	Engineering Chemistry Lab			3	2	30	70	100
9	14CS1152	Basic Computing Lab			3	2	30	70	100
10	14ME1153	Workshop Practice			3	2	30	70	100
Total			19	3	9	25	300	700	1000

L – Lecture, T – Tutorial, P – Practical, C – Credits, CE - Continuous Evaluation, SE - Semester-end Evaluation, T – Total Marks

**Velagapudi Ramakrishna
Siddhartha Engineering College: Vijayawada - 7
Scheme of Instruction and Examination – VR14
Department of Mechanical Engineering**

First Year – Semester II

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14MA 1201	Calculus	4	1		4	30	70	100
2	14PH 1202	Engineering Physics	3	1		3	30	70	100
3	14CS1203	Programming in C	3	1		3	30	70	100
4	14HS 1204	Technical English and Communication Skills	2		2	2	30	70	100
5	14ME 1205	Engineering Mechanics for Engineers	4			4	30	70	100
6	14ME 1207	Engineering Graphics	2		6	5	30	70	100
7	14PH1251	Engineering Physics Lab			3	2	30	70	100
8	14CS1252	C programming Lab			3	2	30	70	100
Total			18	3	14	25	240	560	800

L – Lecture, T – Tutorial, P – Practical, C – Credits, CE - Continuous Evaluation, SE - Semester-end Evaluation, T – Total Marks

**14ME3452-
ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY**

Course Category:	Programme Core	Credits:	2
Course Type:	Laboratory	Lecture - Tutorial - Practice:	0 - 0 - 3
Prerequisites:	Nil	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Conduct and analyze the parameters of electrical network											
	CO2	Analyze the performance of DC and AC machines.											
	CO3	Conduct and analyze the steady state characteristics of electronic devices.											
	CO4	Design of combinational circuits.											
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1		H					M					
	CO2		H					M					
	CO3		H					M					
	CO4		H					M					
Course Content	Electrical Lab: 1. Verification of KVL and KCL. 2. Parameters of choke coil. 3. Measurement of low and medium resistance. 4. OCC of separately excited DC shunt generator. 5. Load characteristics of DC shunt generator. 6. Brake test on DC shunt motor. 7. Load test on 3-phase induction motor.												
	Electronics Lab: 1. V-I characteristics of junction diode. 2. V-I characteristics of zener diode. 3. Characteristics of FET												

	8. Solution of partial differential equations. 9. Solution of some Mechanical Engineering Problems using MATLAB Toolboxes.
Text books and Reference books	1. Matlab programming by Y.Virani Singh & B.B.Chaudhuri. PHI publications(2010). 2. Getting started with Mat lab-a quick reference for scientists & engineers by Rudra Pratap. Oxford university press(2009). 3. an introduction to programming and numerical methods in Matlab by s.r.Otto, j.p.denier. Springer publications(2007). VR10 DEPARTMENT OF MECHANICAL ENGINEERING, V.R SIDDHARTHA ENGINEERING COLLEGE 99 4. Ordinary & partial differential equations routines in Matlab-H.J.Lee & W.E.Schieser. champmans hall /CRC (2004). 5. Graphics and GUI'S with Matlab, 3rd edition by Patrick Marchand, O.Thomas Holland. champmans hall /CRC (2004).
E-resources and other digital material	Web References: 1. http://www.math.ucsd.edu/~bdriver/21d-s99/matlab-primer.html 2. http://www.mathworks.in/academia/student_center/tutorials/launchpad.html 3. http://www.cyclismo.org/tutorial/matlab/ 4. http://www.mathworks.com/matlabcentral/fileexchange?s_cid=wiki_matlab_17 Videos: 1. http://www.youtube.com/user/matlab?feature=results_main 2. http://www.youtube.com/watch?v=DPLBPdux6bs

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Semester III

	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14MA1301	Complex Analysis and Numerical Methods	4	1		4	30	70	100
2	14ME3302	Mechanics of Materials	4	1		4	30	70	100
3	14ME3303	Basic Thermodynamics	3	1		3	30	70	100
4	14HS1304	Environmental Studies	3			3	30	70	100
5	14EC1305	Basics of Electronics Engineering.	2			2	30	70	100
6	14ME3306	Kinematics of Machines	3	1		3	30	70	100
7	14ME3307	Manufacturing Processes	3	1		3	30	70	100
8	14ME3351	Computer Aided Drafting Laboratory			3	2	30	70	100
9	14ME3352	Manufacturing Process Lab			3	2	30	70	100
Total			22	5	6	26	270	630	900

L – Lecture, T – Tutorial, P – Practical, C – Credits, CE - Continuous Evaluation, SE - Semester-end Evaluation, T – Total Marks

Velagapudi Ramakrishna
Siddhartha Engineering College: Vijayawada - 7
Scheme of Instruction and Examination – VR14
Department of Mechanical Engineering

Semester IV

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14MA1401	Transformations and Probability Distributions	3	1		3	30	70	100
2	14ME3402	Advanced Mechanics of Materials	4	1		4	30	70	100
3	14ME3403	Fluid Mechanics	3	1		3	30	70	100
4	14ME3404	Applied Thermodynamics	4	1		4	30	70	100
5	14EE1405	Basics of Electrical Engineering	2			2	30	70	100
6	14ME3406	Material Science and Metallurgy	3			3	30	70	100
7	14ME3451	Computational Methods Lab			3	2	30	70	100
8	14ME3452	Electrical and Electronics Engineering Lab			3	2	30	70	100
9	14HS1453	Communication Skills Lab			2	2	30	70	100
Total			19	4	8	25	270	630	900

L – Lecture, T – Tutorial, P – Practical, C – Credits, CE - Continuous Evaluation, SE - Semester-end Evaluation, T – Total Marks

14ME3451 – COMPUTATIONAL METHODS LABORATORY

Course Category:	Programme Core	Credits:	2
Course Type:	Laboratory	Lecture - Tutorial - Practice:	0 - 0 – 3
Prerequisites:	14MA1301 (Complex Analysis and Numerical Methods) 14ME3302 (Mechanics of Materials) 14ME3402 (Advanced Mechanics of Materials)	Continuous Evaluation: Semester end Evaluation: Total Marks:	30 70 100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Understand basic commands in Mat lab											
	CO2	Perform Matrix Operations											
	CO3	Solve ordinary and partial differential equations											
	CO4	Perform numerical Integration											
Contribution of Course Outcomes towards achievement of Program Outcomes	CO5	Develop Line and Surface Plots											
		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H											
	CO2	H				M							
	CO3	L				H						H	
Course Content	CO4	L				H						H	
	CO5		M									H	
Course Content		List of Exercises: 1. Basics of MATLAB. 2. Mathematical operations on matrices. (Addition, Multiplication, Division) 3. Transpose, determinant and inverse of a matrix. 4. Solutions of simultaneous algebraic equations. 5. Numerical integration. 6. Line and Surface Plots 7. Solution of ordinary differential equations.											

	<p>UNIT II : Phase diagrams: Binary phase diagrams – Phase rule – one component system, two component system, isomorphous, eutectic, eutectoid, peritectic and peritectoid systems, Fe-Fe₃C equilibrium diagram. Heat treatment of steels: TTT diagrams for eutectoid, hypo and hyper eutectoid steels.</p> <p>UNIT III : Heat treatment processes: Annealing, normalizing, hardening, tempering, austempering, martempering, flame Hardening, Induction Hardening & Chemical hardening techniques, hardenability concept and experimental determination. Strengthening mechanisms: Strain hardening, solid solution strengthening, grain refinement, dispersion strengthening.</p> <p>UNIT IV : Powder metallurgy: Powder metallurgy process, preparation of powders, characteristics of metal powders, mixing, compacting, sintering, Applications of Powder Metallurgy.</p> <p>Composite materials: Classification of composites, various methods of component manufacture of composites, particle reinforced materials, fiber reinforced composite materials, and metal matrix composites.</p>
Text books and Reference books	<p>Text Books: [1] Kodgirie .V.D and Kodgirie.S.V, “Material Science and Metallurgy”, Thirty-seventh Edition, Everest House Publication,2015. [2] Raghavan.V, “ Material Science and Metallurgy” ,Fifth Edition, PHI Learning Pvt Limited,2013</p> <p>Reference Books: [1] Avenner , “Introduction to Physical Metallurgy”, Second Edition, Tata McGraw hill Education (India) Pvt Limited,1997. [2] Rajput R. K , “Material Science and Engineering”, Fourth Edition, S.K.kataria& Sons,2009.</p>
E-resources and other digital material	<p>[1] Prof.R.N.Ghosh, IIT Kharagpur, Solidification Binary Alloys, Iron-Carbon Phase Diagram,[English] Web Available: https://www.youtube.com/results?search_query=prof.r.n+ghosh+lectures [2]Prof.S.K.Gupta, IIT Delhi, Phase Diagrams, Crystal imperfections [English] Web Available: https://www.youtube.com/watch?v=x3n9ht-eRfg</p>

14MA1101 - LINEAR ALGEBRA& DIFFERENTIAL EQUATIONS

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 1 - 0
Prerequisites:	Fundamentals of Matrices, Integration, Differentiation.	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Understand the concept of eigen values and eigen vectors and able to reduce a quadratic form to canonical form.											
	CO2	Able to solve the linear differential equations by using appropriate methods.											
	CO3	Able to form Partial Differential equations and solve Partial Differential equations.											
	CO4	Understand the concepts of Laplace Transforms and able to apply to solve Differential Equations, Integral Equations by Transform method.											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H	L			H						M	
	CO2	H	H			H						M	
	CO3	H	H			H						H	
	CO4	H	M			H						H	
(L – Low, M- Medium, H – High)													
Course Content	<p>UNIT I: Linear Algebra: Rank of a Matrix, Elementary transformations, Inverse of a matrix (Gauss Jordan Method) Consistency of Linear System of Equations, Linear Transformations, Vectors, Eigen Values, Properties of Eigen Values, Cayley– Hamilton Theorem (Without Proof),Reduction to Diagonal Form, Reduction of quadratic form to canonical form , Nature of a Quadratic Form, Complex Matrices.</p> <p>UNIT II: Differential Equations of First Order: Formation of a Differential Equation, Solution of a Differential Equation, Linear Equations, Bernoulli's Equation, Exact Differential Equations, Equations</p>												

	<p>Reducible to Exact Equations, Orthogonal Trajectories, Newton's Law of Cooling, Rate of Decay of Radio-Active Materials.</p> <p>Linear Differential Equations of Higher Order: Definitions, Operator D, Rules for Finding the Complimentary Function, Inverse Operator, Rules for finding Particular Integral, Working Procedure to Solve the Equation.</p> <p>UNIT III: Linear Dependence of Solutions, Method of Variation of Parameters, Equations reducible to Linear Equations With Constant Coefficients: Cauchy's Homogeneous Linear Equation, Legendre's Linear equation, Simultaneous linear differential equations with constant coefficients.</p> <p>Partial Differentiation: Total Derivative, Change of Variables, Jacobians.</p> <p>Partial Differential Equations: Introduction, Formation of Partial Differential Equations, Solutions of a Partial Differential Equations, Equations Solvable by Direct Integration, Linear Equations of First Order.</p> <p>UNIT – IV Laplace Transforms: Introduction, Definition, Conditions for Existence, Transforms of Elementary Functions, Properties of Laplace Transforms, Transforms of Periodic Functions, Transforms of Derivatives, Transforms of Integrals, Multiplication by t^n, Division by 't', Evaluation of Integrals by Laplace Transforms, Inverse Transforms, Method of Partial Fractions, Other Methods of Finding Inverse, Convolution Theorem, Application to Differential Equations, Unit Step and Unit Impulse Functions.</p>
Text books and Reference books	<p>Text Book: 1. B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition Khanna Publishers, 2012.</p> <p>Reference Books: 1. Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons. 2. Peter V.O.Neil, "Advanced Engineering Mathematics", Thomson, Canada. 3. R.K.Jain and S.R.K.Iyengar, "Advanced Engineering Mathematics", 3rd Edition Narosa Publishers. 4. N.P.Bali, Manish Goyal, "A Text Book of Engineering Mathematics", LaxmiPublications(P) Limited. 5. B.V.Ramana, "A text book of mathematics", Tata MC Graw Hill.</p>

14ME3406: MATERIAL SCIENCE AND METALLURGY

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 0 - 0
Prerequisites:	(14PH1102/1202) Engineering Physics (14CH1102/14CH1202) Engineering Chemistry	Continuous Evaluation: Semester end Evaluation: Total Marks:	30 70 100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Understand the Concept of structure and properties of materials.											
CO2	Understand about Phase Diagrams and TTT Heat treatment of Steels.											
CO3	Understand Heat treatment processes and Strengthening Mechanisms.											
CO4	Understand the Principles of Powder Metallurgy and manufacturing Methods of different types of Composites											
Contribution of Course Outcomes towards achievement of Program Outcomes	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	H		M									
CO2	H		M									
CO3	H		M									
CO4	H		M									
(L – Low, M- Medium, H – High)												
Course Content	<p>UNIT I : Properties of materials: Physical properties - Mechanical properties – Electrical properties, Magnetic Properties and Chemical properties.</p> <p>Crystallography: Classification of crystals – Bravi's lattices – Miller Indices – Packing factor in cubic systems – coordination number – crystal imperfections – crystal deformation – Slip and Twinning.</p>											

	<p>UNIT – III D.C. Machines: classification of dc machines; Principle of motor and generator; back emf; Torque of a dc machine; Load characteristics of shunt, series motors AC Machines: Classification of ac machines; Production of rotating field; Constructional features – principle of operation; Torque-slip characteristics;</p> <p>UNIT – IV Measuring Instruments: Classification of instruments; Principle of operation of moving-coil and moving-iron instruments; – Dynamometer –type watt meter Utilization: Principles of resistance and induction heating – principles of electrical traction – speed time characteristics</p>
Text books and Reference books	<p>Text Book: [1] I.J.Nagrath and Kothari, “Theory and problems of Basic Electrical Engineering”, Prentice-Hall of India Pvt. Ltd</p> <p>Reference Books: [1] Dr. K. Uma Rao, Dr. A. Jayalakshmi, “Basic Electric Engineering”, Pearson Publications. [2] T.K. Nagasarkar and M.S. Sukhja, “Basic Electric Engineering”, Oxford University Press.</p>
E-resources and other digital material	---

E-resources and other digital material	<p>[1] mathworld.wolfram.com [2] http://www.nptel.iitm.ac.in</p>
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14CH1102-ENGINEERING CHEMISTRY

Course Category:	Institutional Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practice:	3 - 1 - 0
Prerequisites:	14CH1102, Engineering Chemistry Knowledge of Chemistry at Intermediate level	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Analyze various water treatment methods and boiler troubles.											
	CO2	Apply the knowledge of different phases in materials, working principle of electrodes and batteries and their application in chemical and other engineering areas.											
	CO3	Evaluate corrosion processes as well as protection methods and apply the principles of UV-visible spectroscopy in chemical analysis.											
	CO4	Apply the knowledge of nature of polymeric materials for their application in technological fields and of fuels for their conservation.											
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1		H										
	CO2	M											
	CO3											H	
	CO4			M									
Course Content	UNIT I: Water technology-I: Sources and impurities of water, WHO standards - Water treatment for drinking purpose - sedimentation, coagulation, filtration, various methods of disinfection and concept of break-point chlorination - Desalination of brackish water - principle and process of electrodialysis and reverse osmosis. Water technology-II: Boiler troubles - scales, sludges, caustic												

14EE1405 – BASICS OF ELECTRICAL ENGINEERING

Course Category:	Institutional Core	Credits:	2
Course Type:	Theory	Lecture - Tutorial - Practice:	2 - 0 - 0
Prerequisites:	Engineering Physics 14PH1202	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Understand the Fundamentals of Electric Circuits											
	CO2	Understand the Fundamentals of Electromagnetism											
	CO3	Apply the Basic Concepts of Electric Machines											
	CO4	Understand the Principles of Measuring Instruments and Electrical Energy Utilization											
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	M	M	M									
	CO2	M	L	L									
	CO3	M	M	M									
	CO4	M	M	M									
Course Content	Unit I DC Circuits: Definitions of Work, Power, Energy and Torque; Ohm's law; Kirchhoff's Laws; Series-Parallel resistive circuits; Star-delta Transformation; AC circuits: Generation of Sinusoidal Signal ; RMS, Average Values, Form Factor, Peak Factor UNIT –II Magnetic effect of an electric current; cross and dot conventions; concept of m.m.f., flux, flux density, reluctance, permeability and field strength; Self and Mutual inductances; Fleming's left hand rule; Faraday's laws of electromagnetic induction, statically and dynamically induced e.m.f.,												

**E-resources
and other
digital
material**

[1].<http://www.iscid.org/encyclopedia/Tthermodynamics>.
[2].<http://www.transtutors.com/>

embrittlement and boiler corrosion – causes, disadvantages and prevention, Internal conditioning methods – phosphate, calgon and sodium aluminate – External treatment methods – zeolite and ion-exchange methods.

UNIT II:

Phase rule: Concept of phase, component, degree of freedom, Gibb's phase rule definition - phase equilibrium of one component – water system - phase equilibrium of two-component system – sodium chloride-water system and silver-lead system – advantages, limitations and application of phase rule.

Electrochemistry: Calomel electrode, silver-silver chloride electrode and glass electrode, determination of pH using glass electrode - Electrochemical energy systems - Zinc-air battery, Lead-acid battery, Ni-Cd battery, $\text{Li}_x\text{C}/\text{LiCoO}_2$ battery – Advantages of lithium batteries.

UNIT III:

Corrosion science: Introduction – chemical and electrochemical corrosion – electrochemical theory of corrosion – corrosion due to dissimilar metals, galvanic series – differential aeration corrosion – cathodic protection, anodic protection, corrosion inhibitors – types and mechanism of inhibition – principle and process of electroplating and electroless plating.

Instrumental techniques of analysis: Introduction of spectroscopy – interaction of electromagnetic radiation with matter - UV-visible spectroscopy: Frank-Condon principle – types of electronic transitions. Lambert-Beer's law, numericals (simple substitution) – Instrumentation - single beam UV-visible spectrophotometer - applications-qualitative analysis, quantitative analysis, detection of impurities and determination of molecular weight.

UNIT IV:

Polymer technology: Polymerization – Addition and condensation, thermoplastics and thermosettings - conducting polymers – examples, classification-intrinsically conducting polymers and extrinsically conducting polymers- mechanism of conduction of undoped, p-doped and n-doped polyacetylenes – applications of conducting polymers, Fibre reinforced plastics (FRP) - composition and applications.

Fuel technology: Fuels – classification, calorific value, coal – proximate analysis and ultimate analysis, Petroleum – refining, concept of knocking, octane number and cetane number, flue gas analysis by Orsat's apparatus and numericals based on combustion.

Text books and Reference books	<p>Text Book(s):</p> <ul style="list-style-type: none"> • P.C. Jain, Engineering Chemistry, 15th edition, Dhanpat Rai Publishing Company (P) Limited, New Delhi. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. S.S. Dara, A text book of Engineering Chemistry, 10th edition, S. Chand & Company Limited, New Delhi. 2. ShashiChawla, A text book of Engineering Chemistry, Dhanpat Rai & Company Pvt. Ltd., New Delhi. 3. Sunita Rattan, A Textbook of Engineering Chemistry, First edition, S.K. Kataria & Sons, New Delhi, 2012. 4. B.S. Bahl, G. D. Tuli and Arun Bahl, Essentials of Physical Chemistry, S. Chand and Company Limited, New Delhi. 5. Y. Anjaneyulu, Text book of Analytical Chemistry, K. Chandrasekhar and Valli Manickam, Pharma Book Syndicate, Hyderabad. 6. O. G. Palanna, Engineering Chemistry, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
E-resources and other digital material	<ol style="list-style-type: none"> 1. http://www.cip.ukcentre.com/steam.htm 2. http://corrosion-doctors.org/Modi/es/mod-basics.htm 3. http://chemwiki.ucdavis.edu/Analytical_Chemistry.htm 4. http://teaching.shu.ac.uk/hwb/chemistry/tutorials/molspec/uv_visabl.htm 5. http://www.prenhall.com/settle/chapters/ch15.pdf

Text books and Reference books	<p>STEAM TURBINES: Types of steam turbines, Impulse turbines, pressure and velocity compounding, velocity diagrams, work output, power, blade efficiency and stage efficiency, Reaction turbines, velocity diagrams, degree of reaction, work output, power, blade efficiency and stage efficiency, Governing of turbines, Overall efficiency and reheat factor.</p> <p>STEAM CONDENSERS: Jet and Surface condensers, condenser vacuum and vacuum efficiency, Condenser efficiency, Thermodynamic analysis, Air pump.</p> <p>UNIT – III RECIPROCATING AIR COMPRESSORS: Classification, Operation, Effect of clearance volume, compression ratio, volumetric efficiency, indicated power, Single-stage and Multi-stage compressors, Effect of inter-cooling, optimum intermediate pressure in a two-stage compressor.</p> <p>ROTARY COMPRESSORS: Introduction, Types and their applications, principles of working, static and total head values, Centrifugal compressor- velocity vector diagrams, pressure coefficient, pre whirl, Axial flow compressor polytrophic efficiency, Surging, Choking and Stalling, Centrifugal compressor versus axial flow compressor.</p> <p>UNIT – IV GAS TURBINES: Closed and open Brayton cycle gas turbines, analysis of closed cycle gas turbines compressor and turbine efficiencies, gas turbine cycles with intercooling, reheat and regeneration</p> <p>JET AND ROCKET PROPULSION: Basic principles of jet propulsion – specific thrust, propulsive efficiency and overall thermal efficiency of a jet engine; concepts of turbo shaft, turbo prop, turbo fan; principles of rocket propulsion, types of rocket propulsion.</p> <p>Text Books: [1]. A.K. Rajput, “Thermal Engineering”, Eight Edition, Lakshmi Publications, 2014 [2]. Mahesh M. Rathore “Thermal Engineering” Fourth Edition, Tata-McGraw-Hill, 2010.</p> <p>Reference Books: [1]. V.R. Vasandani and D.S. Kumar, Treatise on Heat Engineering, Fourth Edition, Metropolitan Book Company, 1979. [2]. M.D. Burghardt “Engineering Thermodynamics with Applications” Second Edition, Harper and Row Publications, 1982</p>
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14ME3404: APPLIED THERMODYNAMICS

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 1 - 0
Prerequisites:	14ME 3303 Basic Thermodynamics	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Understand the process of steam Generation and applying the principles of thermodynamics in steam nozzles											
	CO2	Understand and analyze the performance of steam Turbines and Steam Condensers											
	CO3	Understand and analyze the performance of reciprocating and rotary compressors											
	CO4	Understand the principles of gas turbines and Jet and Rocket Propulsion											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	M				M							
	CO2	M				H							
	CO3	M				H							
	CO4	M				M							
(L – Low, M- Medium, H – High)													
Course Content	UNIT – I: STEAM BOILERS: Function, classification, working of Cochran boiler and Babcock and Wilcox boiler, Mountings & Accessories. STEAM NOZZLES: Types of nozzles, isentropic flow through nozzles, Effect of friction, Nozzle efficiency, Critical pressure ratio and maximum discharge, calculation of throat and exit areas using Mollier Diagram UNIT - II												

14CS1103- INTRODUCTION TO COMPUTING

Course Category:	Computer Science	Credits:	2
Course Type:	Theory	Lecture - Tutorial - Practice:	2 - 0 - 0
Prerequisites:	--	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Understand the changes in hardware and software components.											
	CO2	Understand the concept of operating system and its functionalities.											
	CO3	Understand types of networks and most common ways of transmitting data via networks and internet.											
	CO4	Identify the ways in which a program can work towards a solution by using some processes and tools.											
	CO5	Develop algorithms and prepare flow charts to simple mathematics and logical problems											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	L	M										
	CO2	M	L										
	CO3	M	L										
	CO4		M										
	CO5	M	M										
(L – Low, M- Medium, H – High)													
Course Content	UNIT I: Exploring Computers and their uses: Overview: Computers in our world, The computer defined, Computers for individual users, Computers for organizations, Computers in society, Why are computers so important. Looking inside the computer system Overview: Detecting the ultimate machine, The parts of a computer system, The information processing cycle, Essential computer hardware: processing devices, memory devices, Storage devices, System												

software, Application software, Computer data, Computer users.

Input and Output devices: Overview: Input devices and output devices, various types of input/output devices.

UNIT II:

Transforming data into information: Overview: The difference between data and information, How computers represent data, How computers process data, Machine cycles, Memory, Factors effecting processing speed, The computer's internal clock, The Bus, Cache memory.

Types of storage devices: Overview: An ever-growing need, Categorizing storage devices, Magnetic storage devices-How data is stored on a disk, How data is organized on a magnetic disk, How the operating system finds data on a disk, Diskettes, hard disks, Removable high-capacity magnetic disks, Tape drives, Optical storage devices, Solid-state storage devices, Smart cards, Solid-state disks. Operating systems basics: Overview, The purpose of operating systems, Types of operating systems, Providing a user interface. Networking Basics: Overview, Sharing data anywhere, anytime, The uses of a network, Common types of networks, Hybrid networks, How networks are structured, Network topologies and protocols, Network media, Network hardware.

UNIT III:

Data Communications: Overview, The local and global reach of networks, Data communications with standard telephone lines and modems, Modems, uses for a modem, Using digital data connections, Broad band connections, Wireless networks.

Productivity Software: Overview: Software to accomplish the work of life, Acquiring software, Commercial software, Freeware and public domain software, Open-source software, Word processing programs, Spreadsheet programs, Presentation programs, Presenting information managers.

Database management Systems: Overview, The mother of all computer applications, Databases and Database Management Systems, Flat-File and Relational Database Structure, DBMS, Working with a database.

UNIT – IV:

Programming languages and the programming process: Overview, The keys to successful programming, The evolution

E-resources and other digital material

1. http://nptel.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/fluid_mechanics/ (Prof.S.Dutta and Prof Niranjan Sahoo)
2. <http://nptel.ac.in/video.php?subjectId=105101082> (Dr. ELDHO T. I., IITBOMBAY).
3. <http://nptel.ac.in/courses/112105171/> (Prof .S.K.Som IIT Khargpur)
4. <http://www.efluids.com/>
5. <http://www.efm.leeds.ac.uk/CIVE/FluidsLevel1/Unit00/index.html>
6. <http://www.freestudy.co.uk/fluid%20mechanics/>

	<p>of fluid particle, type of fluid flow, Description of flow pattern, Rotation and irrotational flow, velocity potential, stream function, continuity equation in Cartesian coordinates.</p> <p>Fluid dynamics: Introduction, Control volume & control surface, Euler's equation of motion along a stream line, Bernoulli's equation and applications, Pitot tube, Venturimeter, orifice meter</p> <p>UNIT – III Impulse momentum equation: Impulse momentum Principle, Equation and Applications-Force on pipe bend</p> <p>Flow through pipes: Types, Reynolds experiment, Darcy-Wiesbach equation, minor losses, hydraulic gradient, Total energy lines, pipes in series and parallel, transmission of power through a pipe, water hammer flow through a circular pipe, Hagen-Poiseuille law.</p> <p>UNIT – IV Boundary layer theory: Introduction, boundary layer thickness, displacement thickness, momentum thickness, energy thickness, boundary layer growth on a flat plate, separation of boundary layer, Methods of controlling boundary layer.</p> <p>Flow of compressible fluids: Equation of state, Gas laws, Equation of motion, Equation of Continuity and Equation of Energy, Propagation of elastic waves, Mach number, Mach cone, Shock waves, Stagnation point concept of lift and drag.</p>
Text books and Reference books	<p>Text Books:</p> <ol style="list-style-type: none"> 1. R.K.Bansal, "Fluid Mechanics and Hydraulic machines", 9th Edition 2011, Laxmi Publications 2. Frank M. White, "Fluid Mechanics" (In SI Units) 7th Edition, McGraw-Hill Publications 3. P.N. Modi & S.M.Seth, "Hydraulics and fluid mechanics", 17th Edition, 2009, Standard Book House <p>Reference Books:</p> <ol style="list-style-type: none"> 1. D.S.Kumar, "Fluid mechanics and fluid power engineering", 7th Reprint 2011 Laxmi Publications 2. Yunus A. Cengel, John M. Cimbala, "Fluid Mechanics Fundamentals and Applications", 3rd Edition, McGraw Hill Education 3. R.K.Rajput "Fluid Mechanics And Hydraulic Machines", 4th Edition, S Chand 4. K.L.Kumar, "Fluid Mechanics", 8th Reprint 2012, S.Chand publications

	<p>of programming languages, World wide web development languages, The Systems development life cycle for programming. Creating Computer programs: Overview: What is a computer program, Hardware/Software interaction, Code, machinecode, programming languages, Compilers and interpreters, planning a computer program, How programs solve problems, Purpose of flowcharts and algorithms, flow chart symbols, drawing flow charts, developing algorithms.</p>
Text books and Reference books	<p>Text Book:</p> <ol style="list-style-type: none"> 1. Peter Norton, Introduction to Computers, sixth Edition, Tata McGraw Hill 2. Computer Fundamentals and C Programming by Reema Thareja.
E-resources and other digital material	<ol style="list-style-type: none"> 1. Lecture Series on Computer Organization by Prof.S. Raman, Department of Computer Science and Engineering, IIT Madras https://www.youtube.com/watch?v=leWKvuZVUE8 2. Lecture Series on Data Communication by Prof.A. Pal, Department of Computer Science Engineering, IIT Kharagpur. https://www.youtube.com/watch?v=sG6WGvzmVaw

14CE1104/14CE1204: BASICS OF CIVIL ENGINEERING

Course Category:	--	Credits:	2
Course Type:	Theory	Lecture - Tutorial - Practice:	2 - 0 - 0
Prerequisites:	--	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Attain basic knowledge on civil engineering materials and civil engineering structures.											
	CO2	Attain basic knowledge on sub-structure and super structure of a building.											
	CO3	Attain basic knowledge on principles of surveying, various types of surveying and various types of transportation systems.											
	CO4	Attain basic knowledge on water supply, sewage.											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H											
	CO2	H											
	CO3	H											
	CO4	H											
(L – Low, M- Medium, H – High)													
Course Content	UNIT - I Building Materials: Introduction - Civil Engineering - Materials: Bricks - composition - classifications - properties -uses. Stone - classification of rocks - quarrying - dressing - properties -uses. Timber - properties -uses -ply wood. Cement - grades -types - properties -uses. Steel - types - mild steel - medium steel - hard steel - properties - uses - market forms. Concrete - grade designation - properties - uses. UNIT - II Building Components: Building - selection of site - classification - components. Foundations -functions - classifications - bearing capacity. Flooring - requirements - selection - types - cement concrete marble - terrazzo floorings. Roof - types and requirements.												

14ME3403 -FLUID MECHANICS

Course Category:	Programme Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practice:	3 - 1 - 0
Prerequisites:	14ME1107,14ME1205	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Understand the Basic concepts of fluid mechanics and analyze hydrodynamic forces in submerged bodies											
	CO2	Understand the various types of fluid flows and analyze stream function, velocity potential.											
	CO3	Analyze fluid flow problems with the application of the continuity , momentum and energy equations											
	CO4	Understand the concepts of laminar & turbulent boundary layer theories and basic concepts of compressible flow											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H				M							
	CO2	M				H							
	CO3	M				H							
	CO4	H				M							
(L – Low, M- Medium, H – High)													
Course Content	UNIT – I Introduction: Definition of fluid, properties of fluid – density, specific weight, specific gravity, viscosity, compressibility, surface tension, capillarity, Classification of fluids, vapor pressure. Fluid statics: Pressure, variation of pressure in fluid, pressure head, Pascal's law, measurement of pressure- simple and differential manometers, Total pressure and center of pressure on plane surfaces, Buoyancy and Metacentric height. UNIT – II Fluid kinematics: Description of fluid flow, Velocity and acceleration												

	<p>[3] S.S.Rattan, "Strength of Materials", Second Edition, Tata McGraw Hill Education Private Limited, 2012.</p> <p>[4] Steven C Chapra & Raymond P Canale, "Numerical Methods for Engineers", McGraw Hill International Edition.</p> <p>[5] Tirupathi R Chandrupatla & Ashok D Belegundu, "Introduction to Finite Elements in Engineering"</p>
E-resources and other digital material	<p>[1] Prof. M.S. Sivakumar, IIT Madras, Strength of material, [English], Web Available: http://nptel.ac.in/courses/112106141/</p> <p>[2] Dr. Satish C Sharma, IIT Roorkee, Strength of material, [English], Web Available: http://nptel.ac.in/courses/112107146/</p> <p>[3] Dr. S. P. Harsha, IIT Roorkee, Strength of material, [English], Video Available: http://nptel.ac.in/courses/112107147/</p>

	<p>UNIT - III Surveying And Transportation: Surveying - objectives - classification - principles of survey. Transportation - classification - cross section and components of road - classification of roads. Railway - cross section and components of permanent way - functions. Water way - docks and harbor - classifications - components. Bridge - components of bridge.</p> <p>UNIT - IV Water Supply And Sewage Disposal: Dams - purpose - selection of site - types - gravity dam (cross section only). Water supply - objective - quantity of water - sources - standards of drinking water - distribution system. Sewage - classification - technical terms - septic tank - components and functions.</p>
Text books and Reference books	<p>Text books</p> <ol style="list-style-type: none"> 1. Raju .K.V.B, Ravichandran .P.T, "Basics of Civil Engineering", Ayyappa Publications, Chennai, 2012. 2. Rangwala .S.C," Engineering Material"s, Charotar Publishing House, Anand, 2012. 3. Basic Civil Engineering by M.S.Palanichamy, Tata McGraw-Hill Publishing Company limited. <p>Reference Books</p> <ol style="list-style-type: none"> 1. Elements of Environmental Engineering, by Dr. K.N. Duggal, S. Chand and company LTD. Ram Nagar, New Delhi. 2. R.Srinivaas, Chartor Publishing House, Arand, 2012
E-resources and other digital material	<ol style="list-style-type: none"> 1. ncees.org/exmas/fe-exma/ 2. www.aboutcivil.com/

14HS1105-PROFESSIONAL ETHICS

Course Category:	Institutional Core	Credits:	2
Course Type:	Theory	Lecture - Tutorial - Practice:	2 - 0 - 0
Prerequisites:	Knowledge about Morals and Values	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Known the Moral autonomy and uses of Ethical theories.											
	CO2	Understand Morals Honesty and Character.											
	CO3	Understand about Safety, Risk and Professional Rights.											
	CO4	Known the Ethics regarding Global issues like Environment, Computer and Weapons Development.											
		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	M											
	CO2						H						
	CO3				M								
	CO4								H				
Contribution of Course Outcomes towards achievement of Program Outcomes													
(L – Low, M- Medium, H – High)													
Course Content	UNIT I: Engineering Ethics : Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion- uses of ethical theories. UNIT II: Human Values : Morals, Values and Ethics – Integrity– Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment –Empathy – Self-Confidence – Character – Spirituality . UNIT III: Engineering as Social Experimentation: Engineering as												

STATICALLY INDETERMINATE BEAMS: Statically indeterminate Beams, Analysis by the differential equations of the Deflection curve, Moment Area Method.

UNIT - II

CONTINUOUS BEAMS: Clapeyron's theorem of three moments, Beams with constant and varying moments of inertia.

CURVED BEAMS: Stresses in Beams of small and large initial curvature, The Winkler-Bach theory, Stresses in Crane Hook with trapezoidal cross- section.

UNIT – III**THIN AND THICK CYLINDRICAL PRESSURE VESSELS:**

Stresses in thin cylindrical vessel subjected to internal pressure. Effect of internal pressure on the dimensions of the thin cylindrical vessel. Stresses in a thick cylindrical shell, Stresses in compound thick cylinders, Initial difference in radii at the junction of the compound cylinder for Shrinkage.

CENTRIFUGAL STRESSES: Introduction, Rotating Ring, Rotating Disc, Rotating Disc of uniform strength.

UNIT - IV

COLUMNS: Buckling and Stability, Columns with Pinned ends, Columns with other support conditions, Limitations of Euler's Formula, Rankine's Formula, Columns with eccentric Axial Loads, Secant formula.

APPLICATION OF NUMERICAL METHODS:

Finite difference methods – uniform bar and beams, Introduction to Finite Element Methods with an example of stepped bar.

Text books and Reference books**Text Books:**

- [1] James M. Gere and Barry J. Goodno, "Mechanics of Materials", Seventh edition, CENGAGE Learning, 2009
- [2] R.K.Bansal, "Strength of Materials" Fifth edition, Laxmi Publishers, 2012

Reference books:

- [1] Dr. Sadhu Singh, "Strength of Materials", Ninth edition, Khanna Publishers, 2007.
- [2] R.K. Rajput, "Strength of Materials", First Edition, S.Chand & Company, 2006.

14ME3402 - ADVANCED MECHANICS OF MATERIALS

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 1 - 0
Prerequisites:	14ME1107 Mechanics for Engineers 14ME1205 Advanced Mechanics for Engineers 14ME3302 Mechanics of Materials	Continuous Evaluation: Semester end Evaluation: Total Marks:	30 70 100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Determine stress, strain and deformations for statically indeterminate members.											
	CO2	Understand the concept and to determine stresses in curved beams and safe load on columns.											
	CO3	Analyze and determine stresses and strains for pressure vessels & rotating discs.											
	CO4	Analyze bar and beam structures using numerical methods.											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H		L		M							
	CO2	M		M		H							
	CO3	M		M		H							
	CO4	M		M		H							
(L – Low, M- Medium, H – High)													
Course Content	UNIT – I STATICALLY INDETERMINATE BARS: Analysis of bars of composite sections, Temperature stresses in composite sections, Effects of misfits and pre-strains or prestress.												

	<p>experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.</p> <p>Safety, Responsibilities and Rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination</p> <p>UNIT IV:</p> <p>Global Issues: Multinational corporations- Environmental ethics-computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics (Specific to a particular Engineering Discipline).</p> <p>Text books and Reference books</p> <p>Text Book(s):</p> <ol style="list-style-type: none"> 1. Mike Martin and Roland Schinzinger. (1996), "Ethics in engineering", McGraw Hill, New York. 2. Govindarajan M, Natarajan S, Senthil Kumar V. S. (2004), "Engineering Ethics", Prentice Hall of India, New Delhi, <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Baum, R.J. and Flores, A., eds. (1978), "Ethical Problems in Engineering, Center for the study of the Human Dimensions of Science and Technology", Rensselaer Polytechnic Institute, Troy, New York, 335 pp. 2. Beabout, G.R., Wennemann, D.J. (1994), "Applied Professional Ethics: A Developmental Approach for Use with Case Studies", University Press of America Lanham, MD, 175 pp <p>E-resources and other digital material</p> <ol style="list-style-type: none"> 1. http://www.professionalethics.ca/ 2. http://ethics.tamu.edu/ 3. http://en.wikipedia.org/wiki/Professional_ethic
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14 ME 1106: BASICS OF MECHANICAL ENGINEERING

Course Category:	Programme Core	Credits:	2
Course Type:	Theory	Lecture - Tutorial - Practice:	2 - 0 - 0
Prerequisites:	Knowledge of Mathematics, Physics, Chemistry at Intermediate Level	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Understand the basic manufacturing methods and power transmission in mechanical engineering											
CO2	Attain basic knowledge of simple stress and strain											
CO3	Realize the importance of energy and identify various sources of energy											
CO4	Understand the principle of operation of different I.C. engines and their applications											
CO5	Describe the performance of different types of refrigeration systems											
	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	M			M			M					
CO2	H			M	M							
CO3	H			H								
CO4	H			L			H					
CO5	H			M			M					
Contribution of Course Outcomes towards achievement of Program Outcomes												
(L – Low, M- Medium, H – High)												
Course Content	<p>UNIT I : Manufacturing Methods : CASTING: Principles of Casting, Advantages & disadvantages, Applications of casting, Green sand moulds</p> <p>LATHE : Description, Main components , Basic operations performed on a Lathe (Turning, Taper turning, Thread cutting, Drilling)</p> <p>WELDING : Types : Equipments, Principles of Gas Welding and Arc Welding, Applications, Advantages & disadvantages of welding,</p>											

Fourier transforms, Fourier sine and cosine transforms - Finite Fourier sine and cosine transforms, Fourier transforms of the derivatives of a function. Parseval's Identity for Fourier Transforms.

Z-Transforms: Definition, Some Standard Z-Transforms, Linearity Property, Damping Rule, Some Standard Results, Shifting un to the Right, Multiplication by 'n', Two Basic Theorems.

UNIT III:

Probability Densities: Continuous random variables – Normal distribution – Normal approximation to the binomial distribution – Other probability densities – Uniform distribution – Log – Normal distribution – Gamma distribution – Beta distribution – Weibull distribution – joint distributions – Discrete and continuous checking if the data are normal – Transforming observations to near normally.

UNIT – IV

Sampling Distributions: Populations and samples – Sampling distribution of the mean (SD known) – Sampling distribution of the mean (SD unknown) – Sampling distribution of the variance.

Statistics: Method of Least Squares – correlation – Regression

Text books and Reference books**Text Book:**

[1] B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition

Khanna Publishers, 2012.(Unit I and Unit II)

(2) Richard A.Johnson, " Probability and statistics for Engineers"– Prentice Hall of India (Unit III and Unit IV)

Reference Books:

(1) Krezig, "Advanced Engineering Mathematics "8th Edition JohnWiley & sons, , 2007.

(2) H.K.Das, Er. Rajnish Verma, "Higher Engineering Mathematics ", 1st Edition, S.Chand 2011.

(3) T.K.V.Iyengar, " Probability and Statistics " S.Chand & Company, 4th Edition, 2012

(4) Rukmangadachari E, " Probability and Statistics", Pearson, 2012

E-resources and other digital material

[1] probweb.berkeley.edu/teaching.html

[2] statsci.org/teaching.html

[3] mathworld.wolfram.com/fourierseries.html

[4] www.thefouriertransform.com

**14MA1401:
TRANSFORMATIONS&PROBABILITY DISTRIBUTIONS (T&P)**

Course Category:	Programme Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practice:	3 - 1 - 0
Prerequisites:	Basic concepts of probability, statistics and Trigonometry	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Analyze general periodic functions in the form of an infinite convergence series of sines and cosines.											
	CO2	Apply Fourier Transforms and Z- Transforms to evaluate indefinite integrals and engineering problems.											
	CO3	Understand the probability densities of continuous random variables for different distributions											
	CO4	Understand the concepts of sampling distribution, estimate correlation and regression coefficients											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H	M			M						M	
	CO2	H	M			M						M	
	CO3	H	M			M						M	
	CO4	H	M			M						M	
(L – Low, M- Medium, H – High)													
Course Content	UNIT – I Fourier Series: Introduction, Euler's Formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, odd and even functions, Expansions of odd and even periodic functions, Half - range series, Parseval's formula, complex form of Fourier series. Practical harmonic analysis. UNIT – II Fourier Transforms: Introduction, Definition, Fourier integrals, Fourier sine and cosine integrals - complex form of Fourier integrals.												

Brazing & Soldering

UNIT II : Simple STRESS and STRAIN: Stress and Strain, definitions, Elasticity, Hooke's Law, Relation between elastic constant

TRANSMISSION : Belt Drives Introduction, Types, Length of Open Belt drive and cross belt drive, Velocity ratio and difference between open belt drive & Cross belt drive, Power transmission by belts

UNIT III : ENERGY RESOURCES

Introduction, Energy Scenario, Classification of Energy Resources, Conventional Energy Resources : working principle of Steam power plant, Nuclear Power plant

Non-conventional Energy Resources : Working principle of Solar Power plant, Wind power plant, Geo-Thermal and OTEC plant

UNIT IV :INTERNAL COMBUSTION ENGINES

Introduction, Classification, Main components of an I.C. engine, Working principle of Two Stroke and Four Stroke Petrol and Diesel engine

REFRIGERATION: Introduction, Classification, Types of Refrigeration, Units of Refrigeration, C.O.P., working of vapour compression refrigeration system, applications of refrigeration

Text books and Reference books

Text Books:

1. Basic Mechanical Engineering by T.S. RAJAN 3rd Edition, New Age International Ltd, First Reprint 1999
2. Machine Design by R.S. KHURMI & J.K. GUPTA, Eurasia Publications House 2005
3. Basic Mechanical Engineering by T.J. PRABHU & V. Jaiganesh, S.Jebbaraj SCI Tech Publications (India) Pvt. Ltd.

Reference Books:

1. Thermal Engineering by R. Rudramoorthy, 4th Reprint 2006 Tata Mc-Graw Hill Publishing Company Ltd, New Delhi (2003)
2. Manufacturing Process by R.K. Rajput, Firewall media (2007)
3. Power Plant Engineering by P.K. Nag Tata Mc Graw Hill Publishing Company Ltd, New Delhi (2011)

E-resources and other digital material

1. www.englishblogger.com/mechanical/mechan
2. www.indiastudychannel.com/resources
3. www.result.khatana.net/2010/07/ge2152
4. www.scribd.com/doc/15653381/basic-mech

14ME1107: MECHANICS FOR ENGINEERS

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 1 - 0
Prerequisites:	Basic knowledge of mathematics and physics	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Construct free body diagrams and develop appropriate equilibrium equations											
CO2	Locate Centroids and simplify the system of forces and moments to equivalent systems											
CO3	Analyze the systems with friction											
CO4	Determine the kinematic relations of particles											
CO5	Apply equations of motion to particle motion											
CO6	Analyze motion of a particle using principle of energy and momentum methods											
	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	H				M							
CO2	H											
CO3					H							
CO4	H											
CO5	M				H							
CO6					H							
Course Content	UNIT I : Concurrent Forces in a Plane: Principles of statics, Force, Addition of two forces: parallelogram Law – Composition and resolution of forces – Constraint, Action and Reaction. Types of supports and support reactions. Free body diagram, Equilibrium of concurrent forces in a plane – Method of projections – Moment of a force, Varignon's Theorem, Method of moments. Parallel Forces in a plane: Introduction, Types of parallel forces, Resultant, couple, Resolution of											

SEMESTER-IV

	IV . CASTING :To make the following castings using Lead or Aluminum metals a. Solid Casting like Dumbell b. Casting with a Central hole c. Rectangular Stepped Block d. Cylindrical Block
Text books and Reference books	Text Books: 1.S.K.Hajra Chowdary, A.K. Hajra Chowdary, Nirjhar Roy,"Elements of Workshop Technology, Vol.I".Media Promoters and Publishers Pvt.Ltd, Mumbai,Scitech Publications, Chennai, 2013

	<p>Force into force and a couple, General case of parallel forces in a plane.</p> <p>Centroids: Determination of Centroids by integration method, Centroids of composite plane figures.</p> <p>UNIT II : General Case of Forces in a Plane: Composition of forces in a plane – Equilibrium of forces in a plane. Friction: Introduction, Classification Of Friction, Laws Of dry Friction, Co-Efficient Of Friction, Angle Of Friction, Angle Of Repose, Cone Of Friction, Wedge Friction. Kinematics of rectilinear translation: Introduction, Displacement, Velocity, Acceleration (uniform).</p> <p>UNIT III : Kinetics of rectilinear translation: Equations of motion, dynamic equilibrium, D'Alemberts principle-related problems Work and energy principle, conservation of energy. Impulse and momentum: principle of impulse and momentum, conservation of linear momentum. Impact-direct, central impact, coefficient of restitution, elastic and plastic impact, loss of kinetic energy during impact, energy and momentum.</p> <p>UNIT IV : Kinematics of curvilinear translation: Introduction, components of velocity and acceleration, Normal and Tangential acceleration, Motion of projectiles</p> <p>Kinetics of curvilinear translation: D'Alemberts principle, rectangular components, Normal and Tangential components, work-energy principle</p>
Text books and Reference books	<p>Text Books:</p> <ol style="list-style-type: none"> 1. Engineering Mechanics by S.Timoshenko & D.H.Young, McGraw Hill International Edition (For Concepts and Symbolic Problems). 2. Engineering Mechanics Statics and Dynamics by A.K.Tayal, Umesh Publications, Delhi, (For numerical problems using S.I.System of units). <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Vector Mechanics for Engineers Statics and Dynamics by Beer and Johnson, Tata McGraw Hill publishing company, New Delhi.

E-resources and other digital material	2. Engineering Mechanics by SS Bhavikatti and KG Rajasekharappa.
	3. Singer's Engineering Mechanics: Statics and Dynamics by K.Vijaya Kumar Reddy and J.Suresh Kumar (Third Edition SI Units- BS Publications).
	1. http://openlibrary.org/books/OL22136590M/Basic_engineering_mechanics
	2. http://en.wikibooks.org/wiki/Engineering_Mechanics
	3. http://nptel.iitm.ac.in/video.php?courseID=1048
	4. http://imechanica.org/node/1551
	5. http://emweb.unl.edu/

14ME3352 MANUFACTURING PROCESS LAB

Course Category:	Institutional Core	Credits:	2
Course Type:	Practice	Lecture - Tutorial - Practice:	3 hrs./week
Prerequisites:	Nil	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Prepare various joints used in fitting.											
	CO2	Prepare various sand moulds.											
	CO3	Fabricate various welding joints.											
Contribution of Course Outcomes towards achievement of Program Outcomes	CO4	Manufacture various solid castings.											
		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H	H	H								L	
	CO2	H	H	H								L	
	CO3	H	H	M								L	
(L – Low, M- Medium, H – High)	CO4	H	H	M								L	
Course Content	I . FITTING : To make the following joints a. Half round joint b. Stepped joint c. Rectangular joint d. Triangular Joint II . MOULDING : To make the following sand moulds a. Single piece pattern (Stepped Rectangular Block) b. Two piece pattern (Step Cone Pulley) c. Two piece pattern (Dumbell) d. Pattern with Core III .WELDING : To make the following welding joints a. To make V-Joint using TIG welding b. To make T- Joint using MIG welding c. To make Butt Joint using MIG welding d. To make Lap Joint using Resistance welding												

	<p>5. Part drawing of eccentric</p> <p>Assembly drawing (using Computer Aided Drafting software)</p> <ol style="list-style-type: none"> 1. Assembly of Screw jack 2. Assembly of Stuffing box 3. Assembly of Drill jig 4. Assembly of Pipe vice 5. Assembly of eccentric
Text books and Reference books	<p>Text Books:</p> <p>[1] K L Narayana, P. Kannaiah, K. Venkat Reddy,” Machine Drawing”, Fourth Edition, New age international publishers, 2014</p> <p>Reference Manual:</p> <p>[1] Auto CAD Manual by Department of Mechanical Engineering, V.R.Siddhatha Engg College.</p>
E-resources and other digital material	<p>[1] Auto Desk, Machine drawing, [English], Web Available: http://www.autodesk.com/education/free-software/autocad</p> <p>http://www.cadtutor.net/tutorials/autocad/</p>

14CH1151-ENGINEERING CHEMISTRY LAB

Course Category:	Institutional Core	Credits:	2
Course Type:	Lab	Lecture - Tutorial - Practice:	0-0-3
Prerequisites:	Knowledge of Chemistry Practicals at Intermediate level	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Analyze quality parameters of water samples from different sources.											
CO2	Perform quantitative analysis using instrumental methods.											
CO3	Apply the knowledge of mechanism of corrosion inhibition, metallic coatings and photochemical reactions.											
	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1		H										
CO2											M	
CO3					M							
(L – Low, M- Medium, H – High)												
Course Content	<p>List of Experiments:</p> <ol style="list-style-type: none"> 1. Determination of total alkalinity of water sample 2. Determination of chlorides in water sample 3. Determination of hardness of water sample 4. Determination of available chlorine in bleaching powder 5. Determination of copper in a given sample 6. Estimation of Mohr's salt – Dichrometry 7. Estimation of Mohr's salt – Permanganometry 8. Determination of zinc in a given sample 9. Conductometric determination of a strong acid using a strong base 10. pH metric titration of a strong acid vs. a strong base 11. Determination of corrosion rate of mild steel in the absence and presence of an inhibitor 12. Chemistry of Blue Printing 13. Colorimetric determination of potassium permanganate 											

Text books and Reference books	14. Preparation of Phenol-Formaldehyde resin 15. Spectrophotometry
	Text Book(s): --- Reference Books: 1. S.K. Bhasin and Sudha Rani, Laboratory Manual on Engineering Chemistry, 2 nd edition, Dhanpat Rai Publishing Company, New Delhi. 2. Sunitha Rattan, Experiments in Applied Chemistry, 2 nd edition, S.K. Kataria & Sons, New Delhi.
E-resources and other digital material	--

14ME3351 - COMPUTER AIDED DRAFTING LABORATORY

Course Category:	Programme Core	Credits:	2
Course Type:	Laboratory	Lecture - Tutorial - Practice:	0 - 0 - 3
Prerequisites:	14ME1251 Engineering graphics	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	To develop drafting features of simple mechanical components.											
	CO2	To develop part drawing views of mechanical components.											
	CO3	To develop assembly views of mechanical components.											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	L		H						M		H	
	CO2	L		H						M		H	
	CO3	L		H						M		H	
(L – Low, M- Medium, H – High)													
Course Content	Computer Aided Drafting: Introduction, Overview, Required Equipment, Computer, Terminal, Keyboard, Plotters, Printers, Digitizers, Locators and Selectors, Display Technology: Plotting the Drawings, Basics of Operating System: Starting AutoCAD, Invoking AutoCAD Commands, Interactive Techniques, Planning for a Drawing: Co-ordinate System, Basic Geometric Commands, Drawing Entity-POINT, LINE, ELLIPSE, POLYGON, RECTANGLE, CIRCLE, ARC Object Selection: Edit Commands Zoom Command Cross-hatching and Pattern Filling Utility Commands. Any Eight of the following Part drawing (using Computer Aided Drafting software) <ol style="list-style-type: none"> 1. Part drawing of Screw jack 2. Part drawing of stuffing box 3. Part drawing of Drill jig 4. Part drawing of Pipe vice 												

	<p>moulding, CO₂ process and continuous casting. Fettling of castings, casting defects: causes, remedies and testing.</p> <p>UNIT III : Welding: Gas and arc welding, principles of oxy-acetylene welding, TIG, MIG, submerged arc welding, arc length, arc blow, duty cycle. Resistance welding principles, Butt welding, Spot welding, Seam welding. Thermit Welding, Electroslag welding. Laserbeam welding. Brazing & Soldering, welding defects, causes and remedies, Weld design-simple problems.</p> <p>UNIT IV : Bulk forming processes: Introduction, Hot and Cold working of metals. Rolling, Forging, Extrusion, Tube making, and Wire drawing.</p> <p>Sheet metal working operations: Introduction, Sheet metal Blanking and Punching operations. Clearance and shear as applied to Punching/Blanking operations. simple related problems. Elastic recovery in bending operation.</p> <p>Text Books: 1. Manufacturing Technology by PN Rao Vol.1, Edition-3, 2009, TMH 2. Principles of Metal Casting by Heine, Loper, Rosenthal. 33rd Reprint, 2008, TMH 3. A course in Work shop technology Vol-I by V.S. Raghuvamshi, 2007, Dhanpatrai & sons. 4. Mechanical Metallurgy by George. E. Dieter, SI Metric Edition 2000, McGraw Hills.</p> <p>Reference Books: 1. Welding and welding Technology by Richard L. Little, 1973, McGraw Hill 2. Workshop Technology Vol.1 by S.K. Hazra Chowdary. Khanna publishers.</p>
Text books and Reference books	
E-resources and other digital material	1. http://nptel.iitm.ac.in 2. http://www.egr.msu.edu 3. http://www.engr.sjsu.edu 4. http://mechatronic.me.hfu.edu.tw 5. http://web.iitd.ac.in

14CS1152- BASIC COMPUTING LAB

Course Category:	Institutional Core	Credits:	2
Course Type:	Lab	Lecture - Tutorial - Practice:	0 - 0 - 3
Prerequisites:	--	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Understand the changes in hardware and software components.											
CO2	Understand the concept of operating system and its functionalities.											
CO3	Understand types of networks and most common ways of transmitting data via networks and internet.											
CO4	Identify the ways in which a program can work towards a solution by using some processes and tools.											
CO5	Develop algorithms and prepare flow charts to simple mathematics and logical problems											
Contribution of Course Outcomes towards achievement of Program Outcomes	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	L	M										
CO2	M	L										
CO3	M	L										
CO4		M										
CO5	M	M										
(L – Low, M- Medium, H – High)												
Course Content	CYCLE - I: Word Processing, Presentations and Spread Sheets 1. Word Processing: (a) Create personal letter using MS Word. (b) Create a resume using MS Word. 2. Spread Sheets: (a) Create a worksheet containing pay details of the employees. (b) Create a worksheet which contains student results.											

(c) Create a worksheet importing data from database and calculate sum of all the columns.

3. Presentations:

- Create a presentation using themes.
- Save, edit, print and import images/videos to a presentation.
- Adding animation to a presentation.

4. MS Access:

- Create simple table in MS Access for results processing.
- Create a query table for the results processing table.
- Create a form to update/modify the results processing table.
- Create a report to print the result sheet and marks card for the result.

CYCLE - II: Hardware Experiments

- Identification of System Layout: Front panel indicators & switches and Front side & rear side connectors. Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards. Install Hard Disk. Configure CMOS-Setup. Partition and Format Hard Disk.
- Install and Configure a DVD Writer or a Blu-ray Disc writer.
- Install windows operating system and check if all the device (graphics, sound, network etc.) drivers are installed.
- Install Linux operating system and check the working of all devices (graphics, sound, network etc.) in the computer.
- Assemble a Pentium IV or Pentium Dual Core Pentium Core2 Duo system with necessary peripherals and check the working condition of the PC.
- PC system layout: Draw a Computer system layout and Mark the positions of SMPS, Mother Board, FDD, HDD, and CD-Drive/DVD- Drive add on cards in table top / tower model systems.
- Mother Board Layout: Draw the layout of Pentium IV or Pentium Dual core or Pentium Core2 DUO mother board and mark Processor, Chip set ICs. RAM, Cache, cooling fan, I/O slots and I/O ports and various jumper settings.

14ME 3307: MANUFACTURING PROCESSES

Course Category:	Programme Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practice:	3 - 1 - 0
Prerequisites:	14PH1102/14PH1202 Engineering Physics 14ME1106 Basics of Mechanical Engineering	Continuous Evaluation: Semester end Evaluation: Total Marks:	30 70 100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Understand the technology of the casting processes.											
CO2	Differentiate various casting methods and their applications.											
CO3	Differentiate various joining processes with applications.											
CO4	Understand various bulk forming and sheet metal processes											
Contribution of Course Outcomes towards achievement of Program Outcomes	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	H		H		H							
CO2	H		L		L							
CO3	H		L		L							
CO4	H		H		H							
(L – Low, M- Medium, H – High)												
Course Content	UNIT I Metal casting: Introduction, General method in making a Casting, pattern: types, materials and allowances. Moulding materials and equipment, Preparation, control and testing of moulding sands. Types of Cores, Gating system design, Riser design and Caines method-simple problems. Cupola: Description, operation and zones. UNIT II : Special casting methods: Permanent Mould Casting, Die Casting: Hot chamber die casting, Cold chamber die casting, Air blown type die casting, Vacuum die casting. Centrifugal casting: True centrifugal casting, Semi-centrifugal casting Centrifuging. Investment casting, shell											

E-resources and other digital material	<ol style="list-style-type: none"> 1. Prof. A. K. Mallik, NPTEL >> Mechanical Engineering >> Kinematics of Machines (Video) 2. http://freevideolectures.com/Course/2359/Kinematics-of-Machines 3. http://www.rapidmaniac.com/search/relevant/All/solution-manual-kinematics-and-dynamics-of-machines 4. http://nptel.iitg.ernet.in/Mech_Engg/IIT%20Delhi/Kinematics%20of%20Machines.htm
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Text books and Reference books	--
E-resources and other digital material	<ol style="list-style-type: none"> 1. Numerical Methods and Programing by Prof.P.B.Sunil Kumar, De-partment of Physics, IIT Madras https://www.youtube.com/watch?v=zjyR9e-N1D4&list=PLC5DC6AD60D798FB7 2. Introduction to Coding Concepts Instructor: Mitchell Peabody View the complete course: http://ocw.mit.edu/6-00SCS11

14ME 1153: WORKSHOP PRACTICE

Course Category:	Institutional Core	Credits:	2
Course Type:	Lab	Lecture - Tutorial - Practice:	3hrs/week
Prerequisites:	Nil	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	To model and develop various basic prototypes in the Carpentry trade such as Lap Joint, Lap Tee Joint, Dove Tail Joint, Mortise and Tenon Joint, and Cross Lap Joint.											
CO2	To develop various basic prototypes in the trade of Welding such as Lap Joint, Lap Tee Joint, Edge Joint, Butt Joint and Corner Joint											
CO3	To develop various basic prototypes in the trade of Tin Smithy such as Saw Edge, Wired Edge, Lap Seam, Grooved Seam and Funnel Preparations											
CO4	To understand various basic House Wiring techniques such as Connecting One lamp with one switch, Connecting two lamps with one switch, Connecting a Fluorescent tube, Staircase Wiring, Godown Wiring											
	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	H	H									L	
CO2	M	H									L	
CO3	M	H									L	
CO4	L	H									L	
Contribution of Course Outcomes towards achievement of Program Outcomes												
(L – Low, M- Medium, H – High)												
Course Content	I. Carpentry : To Make the following Jobs with Hand Tools: a. Lap Joint. b. Lap Tee Joint. c. Dove Tail Joint. d. Mortise and Tenon Joint. e. Cross Lap Joint.											

UNIT II :

VELOCITY ANALYSIS: Introduction, Absolute and Relative Motion, Vectors, Addition and subtraction of Vectors, Motion of a Link, Four Link Mechanism, Angular Velocity of Links, Slider - Crank Mechanism, Crank and Slotted Lever Mechanism.

ACCELERATION ANALYSIS : Acceleration, Four-Link Mechanism, Angular acceleration of Links, Acceleration of Intermediate and offset points, slider-Crank Mechanism, Coriolis acceleration component, Crank and slotted lever Mechanism.

UNIT III :

KINEMATIC SYNTHESIS : Stages of synthesis-Concepts of type, Number and dimensional synthesis - Tasks of dimensional synthesis, Concepts of function generation, Rigid body guidance and path generation, Freudenstein equation for function generation using three precision points for four bar mechanism. (3 precision points only).

CAMS: Introduction, Types of cams, Types of Followers, Definitions, Graphical synthesis of cam profile limited to reciprocating & radial follower. (Knife Edge, Roller and Flat faced Followers).

UNIT IV :

GEARS : Introduction, Classification of gear terminology, Law of Gearing, Velocity of Sliding, Forms of Teeth- Cycloidal Profile Teeth, Involute Profile Teeth, Path of contact, Arc of contact, Number of pairs of Teeth in contact, Interference in Involute Gears, Minimum number of Teeth in Involute Gears, Comparison of Cycloidal and Involute tooth forms.

GEAR TRAINS: Introduction, simple Gear Train, Compound Gear Train, Reverted Gear train, Planetary or Epicyclic Gear Train, Analysis of Epicyclic Gear Train, Torques in Epicyclic Gear Trains. Tabular method only.

Text books and Reference books**Text Books:**

1. S.S.Rattan, "Theory of Machines". 3rd Edition, 15th Reprint. TMH. 2012.
2. J.E. Shigley, "Mechanism and Machine Theory", 4th Edition. Oxford university press. 2011.

Reference Books:

1. C S Sharma and Kamlesh Purohit, "Theory of Mechanisms and Machines", Prentice Hall of India.2006.
2. Ghosh and Mallik, "Theory of Mechanisms and Machines", 3rd Edition. East West Press. 2006.
3. Dr. J.S. Brar, DR. R.K. Bansal, "A text book of Theory of Machines", 5th edition. Laxmi publications.2015

14ME3306: KINEMATICS OF MACHINES

Course Category:	Programme Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practice:	3 - 1 - 0
Prerequisites:	14ME1107 Mechanics for Engineers 14ME1205 Adv. Mech. For Engineers 14ME1205 Engg. Graphics	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Analyze different mechanisms.											
	CO2	Determine position, velocity, and acceleration of linkages											
	CO3	Analyze and Synthesize kinematic linkages											
	CO4	Determine parameters of gears and gear trains											
		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H		M		L							
	CO2	L		M		H							
	CO3	M		H		H							
	CO4	M		H		H							
Contribution of Course Outcomes towards achievement of Program Outcomes													
(L – Low, M- Medium, H – High)													
Course Content	UNIT I : INTRODUCTION : Mechanisms and machines, Rigid and resistant bodies, Link, Kinematic pair, Degrees of Freedom, Classifications of Kinematic pairs, kinematic-chain, Linkage, Mechanism and structure, Classification of mechanisms, Inversions of Mechanism: Four - Link (bar) chain, Single Slider - Crank Chain, Double – Slider Chain. Instantaneous centre, Notation, Number of I - Centres, Kennedy's theorem, Locating I - Centres, Angular velocity by I - Centre Method for simple mechanisms.												

II : Welding : To Make the following Jobs using Electric Arc Welding Process / Gas Welding.

- Lap Joint.
- Tee Joint.
- Edge Joint.
- Butt Joint.
- Corner Joint.

III : Tin Smithy: To do Sheet Metal Operations with Hand Tools:

- Saw Edge.
- Wired Edge.
- Lap Seam.
- Grooved Seam.
- Funnel.

UNIT IV : House Wiring:

- To connect one lamp with one switch.
- To connect two lamps with one switch.
- To connect a fluorescent Tube.
- Stair case wiring.
- Godown Wiring.

Text books and Reference books

1. Kanniah P. & Narayana K. C., "Manual on Workshop Practice", Scitech Publications, Chennai, 1999.

E-resources and other digital material

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SEMESTER-II

	UNIT III DIGITAL ELECTRONICS Number systems – binary codes - logic gates - Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.
	UNIT IV COMMUNICATION SYSTEMS Block diagram of a basic communication system – frequency spectrum - need for modulation - methods of modulation - principles of AM, FM, pulse analog and pulse digital modulation – AM / FM transmitters & receivers (block diagram description only)
Text books and Reference books	TEXT BOOKS: <ol style="list-style-type: none"> 1. Thyagarajan. T, Sendur Chelvi. K. P, Rangaswamy. T. R, “Engineering Basics: Electrical, Electronics and Computer Engineering”, New Age International, Third Edition, 2007. 2. Thomas L. Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education, 2013. 3. G.K.Mithal, "Radio Engineering", 20th Edition, Khanna Publishers, 2011.
E-resources and other digital material	REFERENCES: <ol style="list-style-type: none"> 1. Somanathan Nair. B, Deepa. S. R, "Basic Electronics", I.K. International Pvt. Ltd., 2009. 2. S. Salivahanan, N.Suresh Kumar & A. Vallavaraj, “Electronic Devices & Circuits”, 2nd Edition, Tata Mc Graw Hill, 2008.
	<ol style="list-style-type: none"> 1. http://www.nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASIC-ELECTRONICS/home_page.htm

14EC1305: BASICS OF ELECTRONICS ENGINEERING

Course Category:	Programme Core	Credits:	2
Course Type:	Theory	Lecture - Tutorial - Practice:	2 - 0 - 0
Prerequisites:	-	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:												
	CO1	Gain knowledge about the fundamentals of electronic components, devices, transducers												
	CO2	Understand and apply principles of digital electronics												
	CO3	Get familiarity about basic communication systems												
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	
	CO1	L												
	CO2	M												
	CO3	L												
Course Content	UNIT I ELECTRONIC COMPONENTS Passive components – resistors, capacitors & inductors (properties, common types, I-V relationship and uses). SEMICONDUCTOR DEVICES Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET, optoelectronic devices (LDR, photodiode, phototransistor, solar cell, photocouplers)													
	UNIT II TRANSDUCERS Transducers - Instrumentation – general aspects, classification of transducers, basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers – piezoelectric and thermocouple.													

14MA1201 CALCULUS

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 1 - 0
Prerequisites:	Fundamentals of calculus, vectors and geometry.	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)	CO1	Understand the concept of mean value theorems and apply them to expand functions as Taylors series and determine curvatures											
	CO2	Able to test the convergence of infinite series , tracing of the curves.											
	CO3	Understand the concept of multiple integrals and apply them to evaluate areas and volumes.											
	CO4	Apply the concepts of calculus to scalar and vector fields and establish the relation between the line , surface and volume integrals.											
		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H	L			M						M	
	CO2	H	L			M						M	
	CO3	H	M			M						M	
CO4	H	H			M						H		
Course Content	UNIT I: Differential Calculus: Rolle'sTheorem, Lagrange's Mean Value Theorem,Cauchy's Mean Value Theorem, Taylors Theorem, Maclaurin'sSeries, Taylor's Theorem for Function of Two Variables,Curvature, Radius of Curvature. UNIT II: Asymptotes,Curve Tracing, Maxima and Minima of Function of Two Variables, Lagrange's Method of undetermined Multipliers.												

	<p>Sequence and Series: Convergence of series – Comparison test – D'Alembert's Ratio test – Cauchy's Root Test – Alternating series – Absolute convergence – Leibnitz's Rule.</p> <p>UNIT III: Integral Calculus: Double Integrals, Change of Order of Integration, Double Integrals in Polar Coordinates, Area Enclosed by Plane Curves, Triple Integrals, Volumes of Solids, Change of Variables.</p> <p>Special Functions: Beta Function, Gamma Function, Relation between Beta and Gamma Function, Error Function or Probability Integral.</p> <p>UNIT – IV Vector Calculus: Scalar and Vector Point Functions, Del Applied to Scalar point Functions, Gradient, Del Applied to Vector point Functions, Physical Interpretation of Divergence, Del Applied Twice to Point Functions, Del Applied to Products of Point Functions, Integration of Vectors, Line Integral, Surface Integrals, Green's Theorem in The Plane (without Proof), Stokes's Theorem (without proof), Volume Integral, Gauss Divergence Theorem (without proof), Irrotational Fields.</p>
Text books and Reference books	<p>Text Book: 1. B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition Khanna Publishers, 2012.</p> <p>Reference Books: 1. Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons. 2. Peter V.O.Neil, "Advanced Engineering Mathematics", Thomson, Canada. 3. R.K.Jain and S.R.K.Iyengar, "Advanced Engineering Mathematics", 3rd Edition Narosa Publishers. 4. N.P.Bali, Manish Goyal, "A Text Book of Engineering Mathematics", LaxmiPublications(P) Limited. 5. B.V.Ramana, "A text book of mathematics", Tata MC Graw Hill.</p>
E-resources and other digital material	<p>[1] mathworld.wolfram.com [2] http://www.nptel.iitm.ac.in</p>

	<p>Visit to a local area to document environmental assets—river/forest/grassland/hill/ mountain. Visit to a local polluted site—Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems—pond, river, hill slopes, etc.</p>
Text books and Reference books	<p>Text Book: 1. Text book for ENVIRONMENTAL STUDIES for under graduate courses of all branches of higher education – Erach Bharucha -- For University Grants Commission. First edition 2004.</p> <p>Reference Book: 1 Anjaneyulu Y. Introduction to Environmental sciences, B S Publications PVT Ltd, Hyderabad 2004</p>
E-resources and other digital material	<p>collegesat.du.ac.in/UG/Envirnromental%20Studies_ebook.pdf</p>

UNIT III**Environmental Pollution**

Definition

Causes, effects and control measures of

- | | |
|---------------------|-----------------------|
| (a) Air pollution | (b) Water pollution |
| (c) Soil pollution | (d) Marine pollution |
| (e) Noise pollution | (f) Thermal pollution |
| (g) Nuclear hazards | |

Solid waste management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Disaster management: Floods, earthquake, cyclone and landslides.

UNIT IV**Social Issues and the Environment**

From unsustainable to sustainable development.

Urban problems related to energy.

Water conservation, rain water harvesting, watershed management.

Resettlement and rehabilitation of people; its problems and concerns.

Environmental ethics: Issues and possible solutions.

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

Wasteland reclamation.

Consumerism and waste products.

Environment Protection Act.

Air (Prevention and Control of Pollution) Act.

Water (Prevention and Control of Pollution) Act.

Wildlife Protection Act.

Forest Conservation Act.

Issues involved in enforcement of environmental legislation.

Public awareness.

Human Population and the Environment

Population growth, variation among nations.

Population explosion—Family Welfare Programme.

Environment and human health.

Human rights.

Value education.

HIV/AIDS.

Women and Child Welfare.

Role of Information Technology in environment and human health.

Field Work/ Case Studies {NOT TO BE INCLUDED IN SEMESTER END EXAMS}

14PH1202 – ENGINEERING PHYSICS

Course Category:	Institutional Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practice:	3 - 1 - 0
Prerequisites:	--	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Understand the differences between classical and quantum mechanics and learn about statistical mechanics											
	CO2	Understand various properties and applications of magnetic & dielectric materials and the theory of super conductivity											
	CO3	Analyse and understand semiconductor technology and various types of lasers & optical fibers.											
	CO4	Understand the fabrication of nanomaterials, carbon nanotubes and their applications in various fields											
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H				M			M	L			L
	CO2	H	M	L		M				M			H
	CO3	H	M	M						M			H
	CO4	H		L		M				M	L		H
Course Content	UNIT - I Quantum Mechanics: Dual nature of light, Matter waves and Debroglie's hypothesis, G.P.Thomson experiment, Heisenberg's uncertainty principle and its applications (Non existence of electron in nucleus, Finite width of spectral lines), Classical and quantum aspects of particle, One dimensional time independent Schrödinger's wave equation, physical significance of wave function, Particle in a box (One dimension). Statistical Mechanics: Phase space, Differences between Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (qualitative), Fermi-Dirac probability function, Fermi energy level.												

UNIT - II

Magnetic properties: Magnetic permeability, Magnetization, Origin of magnetic moment, Classification of magnetic materials -dia, para, ferro magnetic materials, Hysteresis curve.

Dielectric properties: Fundamental definitions: Dielectric constant, Electric polarization, Polarizability, Polarization vector, Electric displacement, Electric susceptibility, Types of Polarization: Electronic, Ionic, Orientation, Space charge polarization, Internal fields in solids (Lorentz method), Clausius-Mossotti equations, Frequency dependence of polarization, Ferroelectrics and their applications.

Superconductivity: Introduction, Critical parameters, Flux quantization, Meissner effect, Types of Superconductors, BCS theory, Cooper pairs, London's equation penetration depth, high temperature superconductors, Applications of superconductors.

UNIT - III

Semiconductor Physics: Classification of materials based on energy diagram, Fermi level in Intrinsic and extrinsic semiconductors, Carrier drift and Carrier diffusion, Generation and recombination process (qualitative), Hall Effect.

Lasers: Spontaneous emission, Stimulated emission, Population inversion, Solid state (Ruby) laser, Gas (He-Ne) laser, Semiconductor (Ga-As) laser, Applications of lasers.

Fiber optics: Propagation of light through optical fiber, Types of optical fibers, Numerical aperture, Fiber optics in communication and its advantages.

UNIT - IV

Nanotechnology: Basic concepts of Nanotechnology, Nano scale, Introduction to nano materials, Surface to volume ratio, General properties of Nano materials, Fabrication of nano materials: Plasma Arcing, Sol-gel, Chemical vapour deposition,

Characterization of nano materials: AFM, SEM, TEM, STM, MRFM, Carbon nano tubes: SWNT, MWNT, Formation of carbon nanotubes: Arc discharge, Laser ablation, Properties of carbon nano tubes, Applications of CNT's & Nanotechnology.

people.

- (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
- (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
- (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
- (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

UNIT II**Ecosystems**

Concept of an ecosystem.

Structure and function of an ecosystem.

Producers, consumers and decomposers.

Energy flow in the ecosystem.

Ecological succession.

Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem:

- (a) Forest ecosystem
- (b) Grassland ecosystem
- (c) Desert ecosystem
- (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation

Introduction, definition: genetic, species and ecosystem diversity.

Biogeographically classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

Biodiversity at global, National and local levels.

India as a mega-diversity nation.

Hot-spots of biodiversity.

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

Endangered and endemic species of India.

Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

14HS1304 ENVIRONMENTAL STUDIES

Course Category:	Institutional Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial- Practice:	3 - 0 - 0
Prerequisites:	Concern on Conservation and Preservation of Environment	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Understand the various natural resources, analyze and explore degradation management											
CO2	Understand the Ecosystems and need of Biodiversity											
CO3	Realize and Explore the Problems related to Environmental pollution and its management											
CO4	Apply the Role of Information Technology and analyze social issues, Acts associated with Environment.											
	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	L							H				
CO2			H			H		H				
CO3		L		L		H		H				
CO4								H	H	L	L	L
Contribution of Course Outcome s towards achievement of Program Outcomes												
(L–Low, M–Medium, H – High)												
Course Content	UNIT -I The Multidisciplinary Nature of Environmental Studies Definition, scope and importance Need for public awareness. Natural Resources Renewable and Non-renewable Resources: Natural resources and associated problems. (a) Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forests and tribal											

Text books and Reference books	Textbooks [1] M.N. Avadhanulu & P.G. Kshirsagar, “A text of Engineering Physics”, S.Chand publications. [2] P.K. Palanisamy, “Applied Physics”, Scitech Publishers. Reference Books [1] R.K.Gaur and S.L.Gupta, “Engineering Physics”, Dhanpatrai publishers. [2] S.O. Pillai, “Solid State Physics”, New age international publishers. [3] M.R. Srinivasan, “Engineering Physics” New age international publishers. [4] M.Armugam, “Engineering Physics”, Anuradha publishers.
E-resources and other digital material	[1] http://www.lightandmatter.com/bk4.pdf [2] http://www.ifw-resden.de/institutes/itf/members/helmut/sc1.pdf [3] http://www.microscopy.ethz.ch/history.htm [4] http://nptel.ac.in/courses.php?disciplineId=115 [5] http://aph.huji.ac.il/courses/2008_9/83887/index.html [6] http://freevidelectures.com/Course/3048/Physics-of-Materials/36

14CS1203- PROGRAMMING IN C

Course Category:	Programme Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practice:	3 - 1 - 0
Prerequisites:	--	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Understand the programming terminology and implement various c- tokens & input-output statements to solve simple problems											
CO2	Compare various looping & branching constructs and apply the best looping structure for a given problem											
CO3	Implement arrays and structure/union for storing homogeneous and heterogeneous groups of data											
CO4	Implement programs using pointers to directly accening memory locations & file operations											
CO5	Identify the necessity of modularity in programming and design various function types											
	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	L	M										
CO2	L	M										
CO3		M										
CO4	M	M										
CO5	M	L										
Contribution of Course Outcomes towards achievement of Program Outcomes												
(L – Low, M- Medium, H – High)												
Course Content	UNIT I: Structure of a C Program: Expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion, Statements, Sample Programs. Selection: Logical Data and Operators, Two -Way Selection, Multiway Selection, More Standard Functions.											
	UNIT II: Repetition: Concept of a Loop, Loops In C, Loop Examples, Recursion, The Calculator Program.											

	2010, Lakshmi publications 2010. 3. Rathakrishnan, “Fundamentals of Engineering Thermodynamics”, Second Edition, PHI, 2006
E-resources and other Digital Material	1. nptel.ac.in/courses/112105123/ 2. http://www.learnthermo.com/tutorials.php 3. http://home.iitk.ac.in/~suller/lectures.htm 4. http://elearning.vtu.ac.in/06ME33.html

UNIT II :

FIRST LAW FOR NON FLOW SYSTEMS: First law of thermodynamics for a system undergoing a cycle and for a change in state of system, internal energy and enthalpy, constant volume and constant pressure specific heats and their relation to internal energy and enthalpy of ideal gases.

FIRST LAW FOR FLOW SYSTEMS: Control mass and control volume, first law of thermodynamics for a control volume, steady state steady flow energy equation and application to engineering equipment.

UNIT III :

SECOND LAW OF THERMODYNAMICS: Limitations of First law of thermodynamics. Heat engines and Refrigerators. Statements of Second law of Thermodynamics. Carnot cycle and the two propositions regarding the efficiency of Carnot cycle, Thermodynamic temperature scale, processes-reversible and irreversible, factors that render a process irreversible.

ENTROPY: Inequality of Clausius, Entropy change in reversible process, T-ds relations, Maxwell relations, Entropy change of a system during an irreversible process, Principle of increase of entropy, Entropy change of an ideal gas, Concepts of Exergy, and irreversibility.

UNIT IV :

PURE SUBSTANCES: Pure substance, vapor-liquid-solid phase equilibrium in a pure substance, Independent properties of a pure substance, Equations of state for vapor phase of a simple compressible substance, Tables of thermodynamic properties, thermodynamic surfaces.

VAPOUR POWER CYCLES: Rankine cycle, Effect of pressure and temperature on the Rankine cycle, reheat cycle, regenerative cycle, Deviation of actual cycles from ideal cycles.

Text Books and Reference Books**Text Books:**

1. Yunus A. Cengel M. and Michael A. Boles, "Thermodynamics- An Engineering Approach", Seventh edition, McGraw Hill Education (India) Private Limited, 2011.
2. P.K.Nag, "Engineering Thermodynamics" Fifth edition, Tata McGraw Hill Education Private Limited, 2012..

Reference Books:

1. G.J.Van Wylen & Sonntag, "Fundamentals of Classical Thermodynamics", 4th Edition, 1994 Wiley publication 2005.
2. R.K. Rajput, "Thermal Engineering", Eighth Edition, 8th Edition

Arrays: Concepts, Using Array in C, Inter-Function Communication, Array Applications, Two Dimensional Arrays, Multidimensional Arrays. Functions: Functions in C, User Defined Functions, Inter Function Communication, Standard Functions, Scope.

Strings: String Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions, String- Data Conversion.

UNIT III:

Pointers: Introduction, Pointers For Inter Function Communications, Pointers to Pointers, Compatibility, Lvalue and Rvalue. Pointer Applications: Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array Of Pointers.

Text Input/Output: Files, Streams, Standard Library Input/Output Functions, Formatting Input/Output Functions and Character Input/Output Functions.

UNIT – IV:

Enumerations: The Type Definition (Typedef), Enumerated Types: Declaring an Enumerated Type, Operations on Enumerated Types, Enumeration Type Conversion, Initializing Enumerated Constants, Anonymous Enumeration: Constants, Input/Output Operators.

Structures: Structure Type Declaration, Initialization, Accessing Structures, Operations on Structures, Complex Structures, Structures and Functions, Sending the Whole Structure, Passing Structures Through Pointers. Unions: Referencing Unions, Initializers, Unions and Structures, Internet Address, Programming Applications

Text books and Reference books**Text Book:**

1. Behrouz A. Forouzan & Richard F. Gilberg, "Computer Science A Structured Programming Approach using C", Third Edition, CENGAGE Learning.

Reference Books:

1. Balagurusamy, "Programming in ANSI C 4ed.": TMH, 2009
2. B. Gottfried, "Programming with C (Schaum's Outlines)" Tata McGraw- Hill.
3. Kernighan and Ritchie, "The C programming language": Prentice Hall.
4. Venugopal, et al., "Programming with C": TMH.
5. A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, "Data Structures"
6. Using C, PHI/Pearson education.

E-resources and other digital material	[1] faculty.gvsu.edu/fishbacp/complex/complex.html. [2] nptelvideolectures/iitm.ac.in
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14ME3303 - BASIC THERMODYNAMICS

Course Category:	Programme Core	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practice:	3 - 1 - 0
Prerequisites:	NIL	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	After successful completion of this course, the student will be able to											
CO1	Understand the basic concepts of thermodynamics and differentiate between work and heat forms of energy											
CO2	Apply mass and energy balance equations for open and close thermodynamic systems.											
CO3	Understand the Second law of thermodynamics and the concepts of entropy, energy and irreversibility.											
CO4	Evaluate the properties of pure substances and analyze Rankine's steam power cycle.											
Contribution of Course Outcomes towards achievement of Program Outcomes	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	H		L		M							
CO2	M		H		H							
CO3	M		M		H							
CO4	M		H		H							
Course Content	<p>UNIT I : FUNDAMENTAL CONCEPTS AND DEFINITIONS : Thermodynamic system and control volume, Macroscopic and microscopic points of view, properties and state of a substance, Thermodynamic equilibrium and Quasi-static Process, thermodynamic path, cycle, Zeroth law, concept of temperature, Perfect gases. Equation of a state for perfect gas.</p> <p>WORK AND HEAT: Definition of work, units, work done at the moving boundary of a system, work done in various non-flow processes, definition of heat, units, comparison of heat and work.</p>											

E-resources and Other digital material:	[1] Prof. M.S. Sivakumar, IIT Madras, Strength of material, [English], Web Available: http://nptel.ac.in/courses/112106141/
	[2] Dr. Satish C Sharma, IIT Roorkee, Strength of material, [English], Web Available: http://nptel.ac.in/courses/112107146/
	[3] Dr. S. P. Harsha, IIT Roorkee, Strength of material, [English], Video Available: http://nptel.ac.in/courses/112107147/

14HS 1204–TECHNICAL ENGLISH & COMMUNICATION SKILLS

Course Category:	Programme Core	Credits:	2
Course Type:	Theory	Lecture - Tutorial - Practice:	2-0-2
Prerequisites:	Basic understanding of the language skills ,viz Listening, Speaking, Reading and Writing, including Sentence construction abilities	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Be proficient in administrative and professional compilation skills including web related communication											
	CO2	Attain practice in Interpersonal Communication, in addition to standard patterns of Pronunciation											
	CO3	Be aware of the elements of functional English for authentic use of language in any given academic and/or professional environment											
	CO4	Enhance Reading skills, along with a wide range of Vocabulary											
	CO5	Acquire competence in Technical communication skills											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1			M	M	M	H	H	M	M	H	L	M
	CO2			M	H	L	H	H	H	M	H	L	M
	CO3	M			M		H	H	H	H	H	L	M
	CO4		M	M	M	L	H	H	H	M	H		M
	CO5	L	M	M	H	M	H	H	H	H	H	L	M
Course Content	UNIT:I : Professional Writing Skills 1. Professional Letter- Business, Complaint, Explanation and Transmitta 2. Essay Writing- - Descriptive, Reflective and Analytical- 3. Administrative drafting and correspondence –Memos, Minutes an Web notes												

Text books and Reference books	<p>UNIT II: Interpersonal Communication Skills Communicative Facet- Speech acts- Extending Invitation Reciprocation, Acceptance, Concurrence, Disagreeing without being disagreeable Articulation-oriented Facet- Phonetic Transcription using IPA symbols with Vowel and Consonant charts</p> <p>UNIT III: Vocabulary and Functional English</p> <ol style="list-style-type: none"> 1. A basic List of 500 words – Over view 1. Verbal analogies, Confusibles, Idiomatic expressions and Phrasal Collocations 2. Exposure through Reading Comprehension- Skimming, Scanning, Understanding the textual patterns for tackling different kinds of questions and Taming Regression 3. Functional Grammar with special reference to Concord, Prepositions and Pronoun-referent analysis- <p>UNIT IV: Technical Communication skills:</p> <ol style="list-style-type: none"> 1. Technical Proposal writing 2. Technical Vocabulary- a representative collection will be handled 3. Developing Abstract 4. Introduction to Executive summary 5. Technical Report writing(Informational Reports and Feasibility Reports) <p>Text Book(s):</p> <ol style="list-style-type: none"> 1. TM Farhathullah, Communication skills for Technical Students, I Edition Orient Longman, 2002 2. 'Krishna', English Language Communication Skills, I Edition, Duvvuri Publications, 2008 3. B.S .Sarma, Structural Patterns & Usage in English, IV Edition, Poosha Series, 2008 4. Eclectic Learning materials offered by the Department <p>Reference Books:</p> <ol style="list-style-type: none"> 1 Randolph Quirk, Use of English, Longman, I Edition (1968) Reprinted 2004. 2 Thomson A.J & A.V, Martinet, Practical English Grammar, III Edition, Oxford University Press, 2001 3 Thomas Eliot Berry, The most Common Mistakes in English, TMH, First Paper Back 1971, (reprinted) 2010. 4 John Langan, College Writing Skills, McGraw Hill, IX Edition 2014.

Text book and Reference book:	<p>UNIT - II STATICALLY DETERMINATE BEAMS : Types of Beams, Shear Force and Bending Moment, Relationships between Load, Shear Force and Bending Moment, Shear Force and Bending Moment Diagrams.</p> <p>STRESSES IN STATICALLY DETERMINATE BEAMS: Introduction, Normal Strains in Beams, Normal Stresses in Beams, Shear Stresses in Rectangular Beams, Shear Stresses in Webs of Beams with flanges.</p> <p>UNIT – III DEFLECTIONS OF STATICALLY DETERMINATE BEAMS : Introduction, Differential Equations of the Deflection Curve, Deflections by Integration of the Bending Moment Equation integration of the Shear Force and Load equations, Deflections by Moment Area Method and Macaulay's Method.</p> <p>UNIT – IV TORSION : Introduction, Torsion of Circular Bars, Relationship between Moduli of Elasticity E and G, Transmission of power by circular shafts, Uniform Torsion for Statically determinate Members.</p> <p>UNSYMMETRIC BENDING: Concept of shear centre with an example of channel section.</p> <p>ANALYSIS OF PLANE STRESS : Stresses on inclined Sections, Plane Stress, Principal Stresses and Maximum Shear Stress. Mohr's Circle for Plane Stress. Hooke's Law for Plane Stress.</p>
	<p>Text Books:</p> <ol style="list-style-type: none"> [1] James M. Gere and Barry J. Goodno, "Mechanics of Materials", Seventh edition, CENGAGE Learning, 2009 [2] R.K.Bansal, "Strength of Materials" Fifth edition, Laxmi Publishers, 2012 <p>Reference books:</p> <ol style="list-style-type: none"> [1] Dr. Sadhu Singh, "Strength of Materials", Ninth edition, Khanna Publishers, 2007. [2] R.K. Rajput, "Strength of Materials", First Edition, S.Chand & Company, 2006. [3] S.S.Rattan, "Strength of Materials", Second Edition, Tata McGraw Hill Education Private Limited, 2012. [4] M.Chakraborti, "Strength of Materials", Second Edition, S.K.Kataria & Sons, 2007.

14ME3302 - MECHANICS OF MATERIALS

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 1 - 0
Prerequisites:	14ME1107 Mechanics for Engineers 14ME1205 Advanced Mechanics for Engineers	Continuous Evaluation: Semester end Evaluation: Total Marks:	30 70 100

Course outcomes		Upon successful completion of the course, the student will be able to:													
	CO1	Understand stress-strain concepts and analyze axially loaded members													
	CO2	Illustrate SFD & BMD and analyze the structure subjected to bending & torsion.													
	CO3	Determine deflections of statically determinate beams.													
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)	CO4	Analyse plane stress problems.													
		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l		
	CO1	H		L		M									
	CO2	M		L		H									
	CO3	M		L		H									
	CO4	M		L		H									
Course Content		UNIT - I TENSION, COMPRESSION AND SHEAR : Introduction, Normal Stress and Strain, Stress-Strain Diagrams, Elasticity and Plasticity, Linear Elasticity and Hooke’s Law, Poisson’s Ratio, Shear Stress and Strain, Allowable Stresses and Allowable Loads. AXIALLY LOADED MEMBERS: Axially loaded Members of uniform cross-section, Volumetric strain, Axially loaded Members of non-uniform cross-section, Impact loading.													

	5 Selinkar, Larry et al, English for Academic and Technical Purposes, I edition, Newbury House Publishers, 1981 6 Martin Cutts, Oxford guide to Plain English, 7 th Impression Oxford University Press, 2011 7 V.Sethi and P.V. Dhamija, A Course in Phonetics and Spoken English, II edition, PHI, 2006
E-resources and other digital material	1. www.britishcouncil.org/learning-english-gateway.htm up dated 2014 2. pdfstuff.blogspot.com/2013/.../the-oxford-guide-to-english-usage-pdf.ht . 3. www.cambridgeapps.org/ up dated 2014

14ME1205 - ADVANCED MECHANICS FOR ENGINEERS

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 1 - 0
Prerequisites:	14ME1107 Mechanics for Engineers	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Determine the axial forces in the members of determinate truss.											
	CO2	Develop the equilibrium conditions in terms of virtual work.											
	CO3	Determine moment of inertia of areas.											
	CO4	Determine the resultant and equilibrium conditions for force system in space.											
	CO5	Determine the kinematic relations of rigid bodies.											
	CO6	Determine the mass moment of inertia of rigid bodies.											
	CO7	Apply equation of motion to rigid body.											
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H				M							
	CO2					H							
	CO3	H											
	CO4	H				M							
	CO5	H											
	CO6	H											
	CO7	M				H							
Course Content	UNIT – I Plane Trusses: Method of joints, Method of sections. Principle Of Virtual Work: Equilibrium of ideal systems. Area Moment of Inertia: Moment of Inertia of a plane figure with respect to an axis in its plane - Moment of inertia with respect to an axis perpendicular to the plane of the figure -												

UNIT II:

Taylor's series, Laurent's series, Zeros and singularities. Residue theorem, calculation of residues, evaluation of real definite integrals (by applying the residue theorem).

Standard transformations: Translation - Magnification and Rotation – Inversion and reflection - Bilinear transformation.

UNIT III:

Numerical Methods: Solution of Algebraic and Transcendental Equations : Introduction, Newton - Raphson method, Solution of simultaneous linear equations – Gauss Elimination Method - Gauss - Seidel iterative method.

Interpolation: Introduction, Finite Differences – Forward, Backward, Central Differences, Symbolic Relations, Differences of a polynomial, Newton's formulae for interpolation, Central difference interpolation formulae – Gauss's, Sterling's, Bessel's formulae Interpolation with unequal intervals – Lagrange's and Newton's Interpolation formulae.

UNIT – IV

Numerical Differentiation And Integration : Finding first and second order differentials using Newton's formulae. Trapezoidal rule and Simpsons 1/3 Rule

Numerical Solutions of Differential Equations: Taylor's series method Picard's method. Euler's method, Runge - Kutta method of 4th order, Boundary value problems, Solution of Laplace's and Poisson's equations by iteration.

Text books and Reference books**Text Book:**

[1] B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition Khanna Publishers, 2012.

Reference Books:

- [1] Krezig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons. 2007,
- [2] R.K.Jain and S.R.K.Iyengar, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishers.
- [3] N.P.Bali, Manish Goyal, "A Text book of Engineering Mathematics", 1st Edition, Lakshmi Publications (P) Limited, 2011
- [4] H.K.Das, Er. Rajnish Verma, "Higher Engineering Mathematics", 1st Edition, S.Chand & Co., 2011.
- [5] S. S. Sastry, "Introductory Methods of Numerical Analysis", PHI, 2005.

E-resources and other digital material

- [1] faculty.gvsu.edu/fishbacp/complex/complex.html.
- [2] nptelvideolectures/iitm.ac.in

14MA1301: COMPLEX ANALYSIS & NUMERICAL METHODS

Course Category:	Programme Core	Credits:	4
Course Type:	Theory	Lecture - Tutorial - Practice:	4 - 1 - 0
Prerequisites:	Algebra of Complex numbers, convergence of infinite series, theory of equations	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Determine analytic and non analytic functions and understand the concept of complex integration.											
	CO2	Analyze Taylor and Laurent series and evaluation of real definite integrals using residue theorem and understand the concept of transformations.											
	CO3	Solve Algebraic and transcendental, system of equations and understand the concept of polynomial interpolation.											
	CO4	Understand the concept of Numerical differentiation and integration. Solve initial and boundary value problems numerically.											
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H				M							
	CO2	H				M							
	CO3	H	M			H						M	
	CO4	H	M			H						M	
Course Content	UNIT I: Complex Analysis: Introduction, continuity, Cauchy-Riemann equations. Analytic functions, Harmonic functions, Orthogonal systems, Complex integration, Cauchy's integral theorem, Cauchy's integral formula												

Parallel axis theorem. Moment of Inertia for composite areas.

UNIT - II

Force System in Space: Components of a force, defining a force by its magnitude and two points on its line of action, components of a vector, work done by a force, Resultant of system of concurrent and parallel forces in space. Moment of a force about a point and about an axis, Equilibrium of concurrent and parallel forces in space.

UNIT - III

Moment of Inertia of Material Bodies: Moment of inertia of a rigid body - Moment of inertia of laminae- slender bar, rectangular plate, Circular plate, circular ring, Moment of inertia of 3D bodies- cone, solid cylinder, sphere & parallelepiped.

Rotation of a Rigid Body about a Fixed Axis: Kinematics of rotation, Equation of motion for a rigid body rotating about a fixed axis – Rotation under the action of a constant moment.

UNIT - IV

Kinematics of plane motion: Concepts of relative velocity and instantaneous centre.

Kinetics of plane motion: Equations of motion, Dynamic equilibrium of symmetrical rolling bodies.

Text books and Reference books**Text Books:**

1. A.K.Tayal, "Engineering Mechanics Statics and dynamics" 13th Edition, Umesh Publication Delhi, 2006 (For numerical Problems using S.I. System of Units).
2. S.Timoshenko, D.H.Young, J.V.Rao & Sukumar Pati, "Engineering Mechanics, Fifth Edition, Mc Graw Hill Education (India) Pvt Ltd, 2013,. (For Concepts and symbolic Problems using S.I. System of Units).

Reference Books:

1. SS Bhavikatti and KG Rajasekharappa, "Engineering Mechanics" 4th Edition, New Age International Private Limited, 2012,.
2. K.Vijaya Kumar Reddy and J Suresh Kumar, "Singer's Engineering Mechanics Statics and Dynamics", 3rd Edition, SI Units-BS Publications, 2010.
3. Andrew pytel & Jaan Kiwsalaas, "Engineering Mechanics: Statics and Dynamics", Third Edition, Cengage Learning, 2013.

**E-resources
and other
digital
material**

[1] Prof. U.S. Dixit & Dr.G.Sravana Kumar, IIT Guwahati,
Engineering Mechanics, [English], Video Available:
<http://nptel.ac.in/courses/112103108/>

SEMESTER-III

	3.Pointers (a)Uses of Pointers (b)Passing Arrays and Pointers as a function arguments (c)Pointers to Character Strings 4.User defined data types (a)Type-def (b)Enumeration
Text books and Reference books	--
E-resources and other digital material	Web Rsesources: 1.Numerical Methods and Programing by Prof.P.B.Sunil Kumar, Department of Physics, IIT Madras https://www.youtube.com/watch?v=zjyR9e-N1D4&list=PLC5DC6AD60D798FB7 2.Introduction to Coding Concepts Instructor: Mitchell Peabody View the complete course: http://ocw.mit.edu/6-00SCS11

14ME1207 (G): ENGINEERING GRAPHICS

Course Category:	Institutional Core	Credits:	5
Course Type:	Theory & Practice	Lecture - Tutorial - Practice:	2-6
Prerequisites:	Nil	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Represent various Conics and Curves											
	CO2	Construct Plain and Diagonal Scales.											
	CO3	Draw Orthographic projections of Lines, Planes, and Solids.											
	CO4	Construct Isometric Scale, Isometric Projections and Views and also convert Pictorial views to Orthographic Projections.											
	CO5	Draw Sectional views of the Solids.											
	CO6	Understand Development of surfaces and their representation.											
Contribution of Course Outcomes towards achievement of Program Outcomes (L – Low, M- Medium, H – High)		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1	H		H				H					
	CO2	M		H				H					
	CO3	M		H				H					
	CO4	L		H				H					
	CO5	L		H				H					
	CO6	M		H				H					
Course Content	UNIT I : General: Use of Drawing instruments, Lettering - Single stroke letters, Dimen- sioning, Representation of various type lines - Geometrical Constructions. Scales: Construction and use of plain and diagonal scales. Conic Sections: conic sections - general construction method for ellipse, parabola and hyperbola. Special methods for conic sections. Curves: Curves used in Engineering practice - Cycloid, Involute of circle.												

	<p>UNIT II : Method of Projections: Principles of projection - First angle projection and third angle projection of points and straight lines. Projection of Planes: Projections of planes of regular geometrical lamina. * Introduction to Auto CAD software, drawing different two dimensional and three dimensional views. * 2 D Objects : Triangles, Square, Rectangle, Pentagon, Hexagon, Circle and Ellipse.</p> <p>UNIT III : Projections of Solids: Projections of simple solids such as Cubes, Prisms, Pyramids, Cylinders and Cones - axis inclined to one of the reference plane. Sections of Solids: Sections of solids such as Cubes, Prisms, Pyramids, Cylinders and Cones. True shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Plane). * 3 D Objects : Prisms, Pyramids, Cylinder and a Cone. * Sectional view of a Prism, Pyramid, Cylinder and a Cone in simple positions</p> <p>UNIT IV : Development of Surfaces: Lateral development of cut sections of Cubes, Prisms, Pyramids, Cylinders and Cones. Isometric Projections: Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only). Introduction to Isometric Projections to Orthographic Projections. * Isometric View of Prism, Pyramid, Cylinder and a Cone and also simple 3 Dimensional Objects. * These topics are only for internal assessment.</p>
Text books and Reference books	<p>Text Books: 1. N.D. Bhatt & V.M. Panchal, "Elementary Engineering Drawing", Charotar Publishing House, Anand. 49th Edition - 2006. 2. DM Kulkarni, AP Rastogi, AK Sarkar, "Engineering Graphics with Auto CAD", PHI Learning Private Limited, Delhi. Edition – 2013</p> <p>Reference Books: 1. Prof. K. L. Narayana & Prof. P. Kanniah, "Text Book on Engineering Drawing", Scitech publications (India) Pvt. Ltd., Chennai 2nd Edition - fifth reprint 2006. 2. K. Venugopal, "Engineering Drawing and Graphics + Auto CAD", New Age International, New Delhi.</p>

	<p>(b)Operands, Operators (c)Arithmetic Expressions</p> <p>3.Branching and Selection: (a)Simple-if (b)Nested-if</p> <p>4.Control statements: (a)Break (b)Continue (c)Go to</p> <p>5.Looping constructs-I (a)While (b)Do-while (c)Case control structure: Switch</p> <p>6.Looping constructs-II (a)Simple for (b)Nested for</p> <p>7.Arrays (a)Single dimensional arrays (b)Multi dimensional arrays</p> <p>8.Strings (a)Declaration and initialization of string variables (b)Reading & Writing strings (c)String handling functions (d)Operations performed on strings without using string handling functions</p> <p>CYCLE - II:Advanced programming constructs 1.Concept of user defined functions (a)With arguments and no return value (b)Without arguments and no return value (c)Without arguments and return value (d)With arguments and return value</p> <p>2.File handling operations (a)FILE structure (b)Opening and closing a file, file open modes (c)Reading and writing operations performed on a file (d)File Pointers: stdin, stdout and stderr (e)FILE handling functions: fgetc(), fputc(), fgets() and fputs() functions</p>
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14CS1252- C PROGRAMMING LAB

Course Category:	Institutional Core	Credits:	2
Course Type:	Lab	Lecture - Tutorial - Practice:	0 - 0 - 3
Prerequisites:	Nil	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes	Upon successful completion of the course, the student will be able to:											
CO1	Understand the programming terminology and implement various c- tokens & input-output statements to solve simple problems											
CO2	Compare various looping & branching constructs and apply the best looping structure for a given problem											
CO3	Implement arrays and structure/union for storing homogeneous and heterogeneous groups of data											
CO4	Implement programs using pointers to directly accessing memory locations & file operations											
CO5	Identify the necessity of modularity in programming and design various function types											
	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	L	M										
CO2	L	M										
CO3		M										
CO4	M	M										
CO5	M	L										
Contribution of Course Outcomes towards achievement of Program Outcomes												
(L – Low, M- Medium, H – High)												
Course Content	CYCLE - I: Programming constructs and control structures 1. Introduction to C programming : (a) Use of Turbo C IDE (b) The Structure of a C Program (c) Writing C Programs (d) Building an Executable Version of a C Program 2. Data Types and Variables: (a) Data Types											

E-resources and other digital material	1. http://www.youtube.com/watch?v=XCWJXrkWco 2. http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html#isodrawing 3. http://www.slideshare.net 4. http://edpstuff.blogspot.in
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14PH 1251 – ENGINEERING PHYSICS LAB

Course Category:	Institutional Core	Credits:	2
Course Type:	Lab	Lecture - Tutorial - Practice:	0 - 0 – 3
Prerequisites:	Nil	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

Course outcomes		Upon successful completion of the course, the student will be able to:											
	CO1	Elucidate the concepts of physics through involvement in the experiment by applying theoretical knowledge											
	CO2	Illustrate the basics of electro magnetism, optics, mechanics, and semi-conductors & quantum theory											
	CO3	Develop an ability to apply the knowledge of physics experiments in the later studies											
Contribution of Course Outcomes towards achievement of Program Outcomes		PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
	CO1			H	M								M
	CO2		M			M							
	CO3			H									M
(L – Low, M- Medium, H – High)													
Course Content	1. AC Sonometer -Verification of vibrating laws. 2. Measurement of thickness of a foil using wedge method. 3. Photo tube-Study of V-I Characteristics, determination of work function. 4. Torsional Pendulum-Rigidity modulus calculation. 5. Variation of magnetic field along the axis of a current carrying circular coil. 6. Compound pendulum-Measurement of 'g'. 7. LCR circuit-Resonance. 8. Solar cell -Determination of Fill Factor. 9. Hall effect -Study of B & I Variation. 10. Fibre Optics-Numerical aperture calculation. 11. Newton's Rings-Radius of curvature of plano convex lens. 12. Diffraction grating-Measurement of wavelength. 13. Lissajous figures- calibration of an audio oscillator.												

Text books and Reference books	14. B-H curves- determination of hysteresis loss. 15. Figure of merit of a galvanometer.
	Textbooks [1] Indu Prakash&Rama Krishna, "A text book of practical physics", 25 th ed., Kitab Mahal Publishers, Allahabad, 2003. [2] J.C.Mohanty&D.K.Mishra, "University Practical Physics", 1 st ed., Kalyani Publishers, 1990. [3] D.P.Khandelwal, "A laboratory manual of Physics" Ist ed., Vani educational books , 1991. [4] Dr.Y.Aparna & Dr.K.Venkateswara Rao, "Laboratory manual of engineering physics", 1 st ed., VGS Publications, 2010.
E-resources and other digital material	[1] http://plato.stanford.edu/entries/physics-experiment/ [2] [2] http://www.physicsclassroom.com/The-Laboratory [3] [3] http://facstaff.cbu.edu/~jvarrian/physlabs.html