



SEMESTER -1

Subject Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks					
		L	T	P		MS1	MS2	IA	Th.	Total	
Personality Development Programme for First 15 th Days											
THEORY											
1D01	English &Communication Skills	2	0	0	3	10	10	20	60	100	
1D02	Applied Chemistry-I	3	1	0	3	10	10	20	60	100	
1D03	Applied Physics-I	3	1	0	3	10	10	20	60	100	
1D04	Applied Mathematics-I	4	1	0	3	10	10	20	60	100	
1D05	Computer Fundamental & Information Technology	3	1	0	3	10	10	20	60	100	
PRACTICAL											
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total		
		L	T	P		MP1 (30%)	MP2 (30%)				
1D06	Applied Chemistry Lab-I	0	0	2	2	30	30	40	100		
1D07	Applied Physics Lab-I	0	0	2	2	30	30	40	100		
1D08	Computer Fundamental & IT Lab I	0	0	2	2	30	30	40	100		
1D09	Engineering Drawing	0	0	3	3	30	30	40	100		
1D10	Workshop Practice – I	0	0	3	3	30	30	40	100		
	TOTAL	15	04	12					1000		

SEMESTER -2

Subject Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
THEORY										
2D01	Applied Chemistry-II	3	1	0	3	10	10	20	60	100
2D02	Applied Physics-II	3	1	0	3	10	10	20	60	100
2D03	Applied Mathematics-II	4	1	0	3	10	10	20	60	100
2D04	Electrical & Electronics Technology	3	1	0	3	10	10	20	60	100
2D05	Applied Mechanics	3	1	0	3	10	10	20	60	100
PRACTICAL										
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
2D06	Applied Chemistry Lab-II	0	0	2	2	30	30	40	100	
2D07	Applied Physics Lab-II	0	0	2	2	30	30	40	100	
2D08	Electrical & Electronics Workshop	0	0	2	2	30	30	40	100	
2D09	Workshop Practices-II	0	0	2	3	30	30	40	100	
2D10	Computer Fundamental & IT Lab-II	0	0	2	2	30	30	40	100	
	TOTAL	16	05	10					1000	

SEMESTER -3

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
THEORY										
3DAE01	Workshop Technology & Metrology –I	3	0	0	3	10	10	20	60	100
3DAE02	Engineering Materials and Processes	3	1	0	3	10	10	20	60	100
3DAE03	Basic Automobile Engineering	3	0	0	3	10	10	20	60	100
3DAE04	Thermodynamics & I.C. Engines	3	1	0	3	10	10	20	60	100
3DAE05	Fluid Mechanics & Machine	3	1	0	3	10	10	20	60	100
PRACTICAL										
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
3DAE06	Workshop Technology & Metrology Lab-I	0	0	2	3	30	30	40	100	
3DAE07	Engineering Materials and Processes Lab	0	0	2	3	30	30	40	100	
3DAE08	Basic Automobile Engineering Lab	0	0	2	3	30	30	40	100	
3DAE09	Thermodynamics & I.C. Engines Lab	0	0	2	3	30	30	40	100	
3DAE10	Fluid mechanics & Machines Lab	0	0	3	3	30	30	40	100	
	GRAND TOTAL	15	03	11					1000	

SEMESTER -4

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
THEORY										
4DAE01	Strength of material	3	1	0	3	10	10	20	60	100
4DAE02	Theory of Machines	3	1	0	3	10	10	20	60	100
4DAE03	Electrical & Electronics Engineering	3	0	0	3	10	10	20	60	100
4DAE04	C Programming	3	0	0	3	10	10	20	60	100
4DAE05	Mechanical Estimating & Costing	3	1	0	3	10	10	20	60	100
PRACTICAL										
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total	
		L	T	P		MP1* (30%)	MP2* (30%)			
4DAE06	Strength of material Lab	0	0	2	3	30	30	40	100	
4DAE07	Machine Drawing & Computer Aided Drafting lab	0	0	2	3	30	30	40	100	
4DAE08	Electrical & Electronics Engineering Lab	0	0	2	3	30	30	40	100	
4DAE09	C Programming Lab	0	0	2	3	30	30	40	100	
4DAE10	Technical Seminar	-	-	-	-	-		-	100	
	GRAND TOTAL	15	03	8					1000	

Industrial Training - After examination of 4th Semester, the students shall go for training in a relevant industry/field organization for a minimum period of 6 weeks and shall prepare a diary. It shall be evaluated during 5th semester by his/her teacher. The students shall also prepare a report at the end of training and shall present it in a seminar, which will be evaluated. This evaluation will be done by HOD and lecturer in charge – training in the presence of one representative from training organizations.

SEMESTER -5

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
THEORY										
5DAE01	Auto Thermodynamics	3	1	0	3	10	10	20	60	100
5DAE02	Process in Manufacturing	3	0	0	3	10	10	20	60	100
5DAE03	Workshop Technology & Metrology II	3	0	0	3	10	10	20	60	100
5DAE04	Advanced Workshop Techniques	3	0	0	3	10	10	20	60	100
5DAE05	Industrial Engineering & Transport Management	3	1	0	3	10	10	20	60	100
PRACTICAL										
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
5DAE06	Auto Thermodynamics Lab	0	0	2	3	30	30	40	100	
5DAE07	Process in Manufacturing Lab	0	0	2	3	30	30	40	100	
5DAE08	Workshop Technology & Metrology Lab II	0	0	2	3	30	30	40	100	
5DAE09	Advanced Workshop Techniques Lab	0	0	2	3	30	30	40	100	
5DAE10	Industrial Training	-	-	-	-	-		-	100	
	GRAND TOTAL	15	02	8	-				1000	

SEMESTER -6

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
THEORY										
6DAE01	Auto Electric Equipments	3	0	0	3	10	10	20	60	100
6DAE02	CNC Machines & Automation	3	0	0	3	10	10	20	60	100
6DAE03	Vehicle Technology	3	0	0	3	10	10	20	60	100
6DAE04	Component Design & Estimation	3	1	0	3	10	10	20	60	100
6DAE05	Power Generation	3	1	0	3	10	10	20	60	100
PRACTICAL										
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
6DAE06	Auto Electric Equipments Lab	0	0	2	3	30	30	40	100	
6DAE07	CNC Machines & Automation Lab	0	0	2	3	30	30	40	100	
6DAE08	Vehicle Technology Lab	0	0	2	3	30	30	40	100	
6DAE09	Auto Shop & Garage Practice	0	0	2	3	30	30	40	100	
6DAE10	Project	-	-	-	-	-		-	100	
	GRAND TOTAL	15	02	8	-				1000	

Semester-I		
1D01: English Communication & Skills-		(L:T:P:-2:0:0)
Objective: English communication encompasses written, oral, visual and digital communication within a workplace context. This discipline blends together pedagogical principles of rhetoric, technology, and software to improve communication in a variety of settings ranging from technical writing to usability and digital media design.		
Unit	Topic	28hrs
Unit – I	Narration, Voice, Basic Sentence Patterns. (Nine basic sentence patterns) Tenses, Common errors (Noun, Pronoun, Articles, Adverb, Punctuation, Preposition etc.) Transformation of Sentences, Determiners, Preposition	6
Unit – II	Modals in Conversational Usage, Prefix, Suffix, Idioms & Phrasal verbs : Modals Can, Could, Should, Will, Would, May, Might, Must, Need not, Dare not, Ought to, Used to. Phrases At all; Instead of; In Spite of; As well as; Set up; Upset; Look up; Call off; Call out; Come across; Set right; Look other. Idioms Work up (excite); Break down; Stand up for; Turn down; Pass away; Pass on; Back up; Back out; Carry out; Done for (ruined); Bring about; Go through; Ran over; Look up (improve); Pick out (selected).	6
Unit – III	Composition - . Unseen Passage, Précis Writing Letter Writing : Letter to the editor of a magazine, newspaper, business letters, letters to relatives, friends, government officers. Report Writing Paragraph Writing, Essay Writing - Essays on general and local topics related to environmental problems	6
Unit – IV	Listening: For improving listening skills the following steps are recommended, Listen to Prerecorded Tapes, Reproduce Vocally what has been heard, Reproduce in Written form. Summaries the text heard, Suggest Substitution of Words and Sentences, Answer Questions related to the taped text, Summaries in Writing Vocabulary: Synonyms. Homonyms. Antonyms and Homophones, Words often confused, as for example, I-me; your-yours; its-it's; comprehensible-comprehensive; complement-compliment] Context-based meanings of the words, for example, man[N] man[vb]; step[[N] ,step[vb] conflict _____ Israel Palestinian conflict Emotional conflict, Ideas conflict learn _____ learn at this school I learnt from the morning news Group Discussion :	5

	Developing skill to initiate a discussion [How to open] Snatching initiative from others [Watch for weak points, etc.]	
Unit – V	<p>Speaking: Introducing English consonant-sounds and vowel-sounds., Remedial exercises where necessary, Knowing Word stress, Shifting word stress in poly-syllabic words [For pronunciation practice read aloud a Para or page regularly while others monitor]</p> <p>Delivering Short Discourses: About one self Describing a Place, Person, Object Describing a Picture, Photo.</p> <p>Expand a topic-sentence into 4-5 sentence narrative.</p> <p>Note :</p> <ol style="list-style-type: none"> 1. The Medium of teaching and examination will be English. 2. The Question on Essay Writing (Unit-7) will be compulsory. The student will have to attempt one essay out of two, touching the given points on general/ local topic related to environmental problems. 3. At least one question will be set from each unit. 4. No theory question will be set from syllabus of practicals. 	5
	<p>Text Books :</p> <ol style="list-style-type: none"> 1. Intermediate English Grammar Raymond Murphy, Pub: Foundation Books, New Delhi 2. Eng. Grammar, usage & Composition Tickoo & Subramanian Pub: S.Chand and Co. 3. Living Eng. Structure Stannard Alien. Pub: Longman 4. A Practical Eng. Grammar Thomson and Martinet. (and its Exercise Books) Pub : ELBS 5. High School English Grammar Wren & Martin. and Composition <p>Reference Book :</p> <ol style="list-style-type: none"> 1. Communicative Skills for Engineers and Scientists by Sangita Sharma and Binod Sharma, New Delhi : Pearson. 2. English for Engineers by Abidi & Ritu, New Delhi : Cengage Learning. 	

1D02: Applied Chemistry-I		(L:T:P:-3:1:0)
Objective	Chemistry is the science of matter, especially its chemical reactions, but also its composition, structure and properties. Chemistry is concerned with atoms and their interactions with other atoms, and particularly with the properties of chemical bonds.	
	Topic	38 Hours
Unit – I	Atomic Structure: Constituents of the Atom, Bohr's Model of the Atom, Quantum Number and Electronic Energy Levels, Aufbau's Principle, Pauli's Exclusion Principle, Hund's Rule, $n + l$ Rule, Electronic Configuration of Elements (s,p,d Block Elements) Development of Periodic Table: Modern Periodic Law, Long form of Periodic Table. Study of Periodicity in Physical and Chemical Properties with, special reference to Atomic and Ionic Radii, Ionisation, Potential. Electron Affinity. Electro negativity. Variation of Effective Nuclear Charge in a Period. Metallic Character.	8
Unit – II	Electro Chemistry: Ionization, Degree of Ionization, Factors which Influence Degree of Ionization . Hydrolysis – Degree of Hydrolysis, Hydrolysis Constant., pH Value, Buffer Solution Electrolysis, Faraday's Laws of Electrolysis	8
Unit – III	Kinetic Theory of Gases: Postulates of kinetic Theory, Ideal Gas Equation, Pressure and Volume Corrections, Vender. Walls Equations, Liquefaction of Gases, Critical Pressure and Critical Temperature, for Liquefaction., Liquefaction of Gases by Joule – Thomson Effect, Claude's Method and Linde's Method Carbon Chemistry: Definition of Organic Chemistry. Difference between Organic and Inorganic Compounds. Classification and Nomenclature - Open Chain and Closed Chain Compounds, IUPAC System of Nomenclature. (upto C5).	8
Unit – IV	Metals and Alloys: General Principles and Terms listed in Metallurgy, Metallurgy of Iron and Steel, Different forms of Iron, Effect of Impurities on Iron and Steel 6.5 Effect of Alloying Elements in Steel Pollution: Water Pollution, Causes and Effects, Treatment of Industrial Water Discharges - Screening, Skimming and Sedimentation Tanks, Coagulation, Reductions, Chlorination, Biological Methods. Air Pollution Causes and Effects Control Methods – Electrostatic Precipitator, Scrubbers, Gravitational Setting Methods, by Plants. Awareness on	8
Unit – V	Water: Sources of Water, Hardness of Water., Degree of Hardness, Estimation of Hardness by EDTA method, Problems on Calculation of Hardness, Disadvantages of Hardness, Softening Methods, Lime-Soda Method, Permutite Method, Ion -Exchange Method Problems on Softening of Water, Drinking Water, its Requisites, Purification and Sterilization of Water.	6
	Text Books: 1.Engineering Chemistry II (Hindi) Mathur and Agarwal 2. Chemistry of Engineering Materials C.V. Agarwal 3. Engineering Chemistry P.C. Jain and Monika 4. Chemistry M.M. Uppal 5.Applied Chemistry (Hndi) V.P.Mehta Jain Bros. Jodhpur Reference Books:	

	1 Instrumental methods of Chemical analysis, MERITT & WILLARD (EAST – WEST press) 2 Physical Chemistry , P.W Atkin (ELBS, OXFORD Press) 3 Physical Chemistry W.J.Moore (Orient Longman)	

1D03: Applied Physics-I		(L:T:P:-3:1:0)
Objective: Physics employs mathematical models and abstractions of physics to rationalize, explain and predict natural phenomena. This is in contrast to experimental physics, which uses experimental tools to probe these phenomena.		
Unit	Topic	36 Hours
Unit – I	Units and Dimensions : Idea of various systems of units, SI units Basic, Supplementary and Derived Units, Prefixes & Symbols, Dimensions and Dimensional Formulae, Principle of Homogeneity of Dimensions, Dimensional Analysis, Applications and Limitations Elasticity : Elasticity, Stress and Strain, Elastic Limit & Hooke's law, Young's Modulus, Bulk Modules & Modulus of Rigidity, Poisson's Ratio	8
Unit – II	Properties of Liquids: Surface Tension & Surface Energy, Cohesive & Adhesive Force, Angle of Contact, Capillarity & Expression for Surface Tension, Streamline & Turbulent Flow, Reynold Number, Viscosity & Coefficient of Viscosity. Stoke's law & Terminal Velocity	8
Unit – III	Sound Waves: Velocity of Sound Waves: Newton's Formula, Laplace Correction, Factors affecting Velocity of Sound Waves Propagation of Progressive Wave, Displacement, Velocity and Acceleration of a particle during propagation of wave Superposition of Waves: Stationary Waves (without mathematical analysis) Resonance tube	8
Unit – IV	Gravitation & Satellites: Newton's law of Gravitation, Acceleration due to Gravity Kepler's laws of Planetary Motion (statement only), Artificial Satellite (simple idea), Geo-Stationary Satellites, Escape Velocity. Velocity & Time Period of an Artificial Satellite. Transfer of Heat: Modes of Transmission of Heat - Idea of Conduction, Convection & Radiation, Thermal Conductivity & Coefficient of Thermal Conductivity Black Body, Kirchhoff's Laws & Stefan Boltzmann Law (statement only), Newton's Law of Cooling & its Derivation from Stefan's Law	6
Unit – V	Electrostatics: Coulomb's Law, Intensity of Electric Field, Intensity due to a Point Charge, Electric Lines of Forces & Electric Flux, Electric Potential, Electric Potential due to a Point Charge D.C. Circuits : Resistivity, Effect of Temperature on Resistance, Ohm's Law, Resistance in Series and Parallel and their Combination Kirchhoff's Law Wheatstone Bridge Meter Bridge Principle of Potentiometer	6
	Suggested Text Books: 1. Engineering Physics Gaur & Gupta (hindi) 2. Applied Physics Vol.-I Hari Harlal, NITTTR 3. Applied Physics Vol.-II Hari Harlal, NITTTR 4. Modern Engineering Physics – A.S. Vasudeva (S. Chand) 5. Solid State Physics : Kittel Suggested Reference Book: 1 Solid State Physics: S. O. Pillai, Wiley Eastern Ltd. 2. Physics Vol-I & II – Resnick & Halliday (Wiley Eastern) 3. A Text Book of Optics – Brij Lal & Subramanyam	

1D04: Applied Mathematics-I		(L:T:P:- 4:1:0)
Objective: We can use of abstraction and logical reasoning, mathematics developed from counting, calculation, measurement, and the systematic study of the shapes and motions of physical objects. Practical mathematics has been a human activity for as far back as written records exist.		
Unit	Topic	Hours
Unit – I	Matrices and Determinants: Definition and Properties of Determinants, Definition and Types of Matrix, Transpose of a Matrix, Symmetric, Skew Symmetric Matrices, Orthogonal matrices, Hermitian and Skew Hermitian, Minors and Cofactors, Adjoint and Inverse of a Matrix, Cramer's Rule, Solution of Simultaneous Linear Equations by Inverse Matrix Method, Characteristic Matrix, Characteristic Equation, Eigen Values & Vectors, Cayley Hamilton Theorem (verification only)	6
Unit – II	Trigonometry: Allied Angle($\sin(180 \pm A)$, $\sin(90 \pm A)$ etc., Sum and Difference Formula (without proof) and their Application, Product Formula and C-D Formula, T-Ratios of Multiple and Sub-Multiple Angles ($2A$, $3A$, $A/2$), Solution of Trigonometric Equations : $\sin X = 0$, $\tan X = 0$, $\cos X = 0$, $\sin X = A$, $\cos X = A$ & $\tan x = A$	6
Unit – III	Introduction to Different Types of Expansion: Factorial Notation, Meaning of $C(n, r)$, $P(n, r)$, Binomial Theorem for Positive Index, any Index, Exponential Theorem, Logarithm Theorem Complex Number: Definition of Complex Number, Operations on Complex Number (Add., Sub ,Multiplication, Division), Conjugate Complex Number, Modulus and Amplitude of a Complex Number, Polar form of a Complex Number	8
Unit – IV	Two Dimensional Coordinate Geometry: General Introduction, Distance Formula and Ratio Formula ,Co-ordinate of Centroid, In-Centre, Ortho-Centre and Ex-Centre of a Triangle, Area of Triangle, Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form, Angle between Two Lines Perpendicular Distance of a Line from a Point	7
	Text Books: 1. Mathematics XI & XII NCERT, New Delhi 2. Mathematics XI & XII Rajasthan Board, Ajmer(Hindi) 3. Polytechnic Mathematics H. K. Dass 4. Text Book on Differential Calculus Chandrika Prasad Reference Books: 1:Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition. 2:Higher Engineering Mathematics, B.V.Ramana, Tata McGraw Hill. 3: Thomas Calculus, Maurice D. Weir, Joel Hass and others, Pearson, 11th Edition.	

1D05: Computer Fundamental & Information Technology		(L:T:P: 3:1:0)
Objective: Computer programming (often shortened to programming or coding) is the process of designing, writing, testing, debugging, and maintaining the source code of computer programs. This source code is written in one or more programming languages.		
Unit	Topic	37 Hours
Unit – I	Introduction: Computer: An Introduction, Generation of Computers & Types : PC, PC/XT, PC/AT, Main Frame, Super, LapTop, Pam Top, Central Processing Unit (CPU) Memory Unit, Input/ Out Devices : Keyboard, Mouse (Optical), Digitizer, Scanner, Web Camera, Monitor (CRT, TFT) , Printers, Plotters, Bar Code Reader, Secondary Storage Devices : Floppy, Hard Disk, CD, DVD, Flash, Drive, Block Diagram Showing Interconnection of Computer Parts, Data Representation: Bit, Nibble, Byte, Word, Number System : Decimal, Binary, Hexadecimal & their Conversions, Arithmetic Operations (Addition, Subtraction using Binary Number System) 1s , 2s Compliment, Coding Technique : BCD, EBCDIC, ASCII ,Idea of: Hardware ,Software, Firmware, Free ware, Human ware, Computer Languages and Translators Machine, Assembly, High Level Language, Scripting Language, Object Oriented Language, Platform Independent Language, Translators: Assembler, Interpreter, Compiler	6
Unit – II	Operating System : Definition of Operating System (OS), Types of OS, Single user, Multi user, Multi Programming, Time Sharing, Multi Processing, Introduction to Windows XP: Introduction to Windows Environment, Parts of Windows Screen, Icon, Menu, Start Menu, Minimizing , Maximizing , Closing Windows, Windows Explorer, Recycle Bin, Clipboard, My Computer, My Network Places Control Panel : Adding New Hardware and Software, Display, Font, Multimedia, Mouse, International System Accessories: Paint, Media Player, Scan disk, System Information.	7
Unit – III	Information Concepts and Processing: Definition of Data, Information, Need of Information, Quality of Information, Concepts of Data Security, Privacy, Protection, Computer Virus and their types, Scanning & Removing Virus Computer and Communication: Need of Data Transmission, Data Transmission Media, Baud rate and Bandwidth, Digital and Analog Transmission Serial and Parallel Data Transfer, Protocols, MODEM. Networking of Computers : LAN, WAN, MAN, Blue tooth 6.6 LAN Topologies: Bus, Star, Ring, Hybrid Introduction to Ports : RS232, IEEE 488, PS2, USB, UTP	8
Unit – IV	Information Processing: Word processor, Introduction to MS-Word, Starting MS-Word Special Features of MS-Word, Using Help, Opening Document, Typing and Editing, Copying, Inserting, Moving, Deleting, Copying from One Document to Others , Undo, Redo, Spell Check, Find and Replace, Formatting, Characters and Fonts ,Spacing Removing Characters Formatting, Inserting Symbols, Paragraphs, Page Setting, Header and Footer, Page Breaks, Borders and Shading, Print Preview and Printing, Tables and Columns, Mail Merge. Auto Text and Auto correct, Introduction to Macro, Electronic Spread Sheet, Introduction to MS-Excel, Working with Spread Sheet, Editing the Worksheet, Worksheet Formatting, Formula Entering, Function Wizard, Saving and Printing Work Book, Analysis Tools Data Tools Charts Linking Work Sheets, Report Wizard, Data Base Application, Data Base Components, Working with Database, Creating Excel Database, Adding Records using Data Form, Deleting Records using Menu Command, Deleting Records using Data Form, Editing Records, Finding Records based on Criteria	8
Unit – V	Internet: Introduction to Internet, Bridges, Routers, Switch, Gate way, www, Web Site, URL, e-mail, e-Commerce, Web browsing, Web page, Introduction to Hyper text & HTML, Introduction to http & ftp Protocol. Power Point: Introduction to Power Point, Creating a Presentation/Slide, Adding Animation in Slide, Running a Slide Show	8
	Suggested Text Books: 1. Computer Fundamental V.K. Jain, Standard Pub.& Distributors 2. PC Software for Windows made simple R.K. Taxali, TMH 3. Mastering Windows XP TMH 4. BPB Computer Course BPB Editorial Board,	

	<p>5.1. Computer Fundamental V.K. Jain, (hindi Edition)</p> <p>Suggested Reference Books:</p> <ol style="list-style-type: none"> 1. Introduction to Networking NANCE, PHI 2. First Course in Computer Science Sanjeev Saxena, Vikas Publishing House First Look 3. Web Based Application Development Ivan Beyross, TMHusing HTML, DHTML, Java script <p>Pearl/ CGI</p>	

1D06: Applied Chemistry Lab-I		(L:T:P:-0:0:2)
Objective: Develop the ability of students to carry out experiments, collect and interpret data, and critically report results through "hands-on" laboratory experiences.		
	List of Experiments	
	1. Identification of Acid and Basic Radicals in a Salt (Total Numbers = 5) 2. Analysis of a Mixture Containing Two Salts (Not Containing Interfacing Radicals). (Total Numbers = 5) 3. Determination of Percentage Purity of an Acid by Titration With Standard Acid. 4. Determination of Percentage Purity of a Base by Titration With Standard Alkali Solution. 5. Determination of the Strength of Ferrous Sulphate using Standard Ferrous Ammonium Sulphate and Potassium Dichromate as Intermediate Solution 6. Determination of the Strength of Farrous Sulfate Solution using Standard 7. Solution of Thiosulphate. To determine the strength of NaOH and Na ₂ CO ₃ in a given alkali mixture 8. Estimation of percentage of iron in plain carbon steel. 9. To find the eutectic point for a two component system by using method of cooling curve. 10. Determine the reaction rate constant for the 1st order reaction	
Text Books: 1. Engineering Chemistry, Mathur and Aggarwal 2. A text Book of Engineering Chemistry, S.K. Jain & K.D. Gupta Reference Books: 1. Practical Chemistry For Engineers, Dr. Renu Gupta & Dr. Sapna Dubey		
1D07: Applied Physics Lab-I		
Objective: : An experiment or test can be carried out using the scientific method to answer a question or investigate a problem. he results are analyzed, a conclusion is drawn, sometimes a theory is formed, and results are communicated through research papers.		
	List of Experiments	
	1. To Measure Internal Dia, External Dia and Depth of a Calorimeter using Vernier Callipers. 2. To Measure Density of a Wire using Screwgauge 3. To Measure Radius of Curvature of a Lens, Mirror using Spherometer. 4. To Determine Refractive Index of Glass using Prism. 5. To Determine the Refractive Index of Glass using Travelling Microscope 6. To Determine Focal Length of a Convex Lens by Displacement Method. 7. To Determine the Velocity of Sound at 0°C using Resonance Tube. 8. To Determine Young's Modulus of Elasticity using Searle's Apparatus. 9. To Determine Acceleration due to Gravity using simple pendulum. 10. To verify Newton's law of cooling.	
	Text Book: 1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH) 2. Practical Physics – S.L. Gupta & V. Kumar (Pragati Prakashan). Reference Books: 1.. Advanced Practical Physics Vol. I & II – Chauhan & Singh (Pragati Prakashan)	

1D08: Computer Fundamental & IT Lab- I		
Objective: The choice of language used is subject to many considerations, such as company policy, suitability to task, availability of third-party packages, or individual preference. Ideally, the programming language best suited for the task at hand will be selected.		
	List of Experiments	
	<ol style="list-style-type: none"> 1. Study of Computer Components 2. Practice of Computer Booting Process in XP 3. Demonstration of Windows Environment 4. Practice of using My Computer, Windows Explorer 5. Practice of using Control Panel 6. Practice of My Network Places 7. Practice of CD and DVD Writing 8. Practice of Paint 9. Installation of Windows XP by using NTFS File System. 10. Demonstration of Network 	
	Suggested Text Books: <ol style="list-style-type: none"> 1. Yadav DS, Foundations of IT, New Age, Delhi. 2. Curtin, Information Technology: Breaking News, Tata Mo Grew Hill. Suggested Reference Books: <ol style="list-style-type: none"> 1. Nelson, Data Compression, BPB. 	

1D09: Engineering Drawing		
Objective: In order to produce a good product, a neat drawing is a must. Therefore students must be well acquainted with the knowledge of Engineering drawing. Engineering drawing is the universal language of engineers and student must be made familiar with all the relevant aspect topics of machine drawing.		
	List of Experiments	
	1. Preparation of following on Imperial Size Drawing Sheet :- 1.1 Lines, Letters and Scales 1.2 Geometrical Constructions and Engineering Curves. 1.3 Projection of Lines 1.4 Projection of Planes 1.5 Projection of Solids 1.6 Orthographic Projections of Simple objects 1.7 Section and Development of Surfaces of Solids i.e. Cone, Cylinder, Sphere etc. 1.8 Section and Development of Surfaces of Prism and Pyramids 1.9 Isometric Projections 1.10 Riveted Joints. 1.11 Screw Threads and Fasteners 1.12 Pulleys 1.13 Couplings 1.14 Bearing 1.15 Building Drawing 2. Preparation of following Drawings in Sketch Book (Home Assignment) 2.1 Lettering (On Graph Sheet) 2.2 Projection of Points In Different Quadrants 2.3 Isometric Projection of Various Planes 2.4 Various Types of Rivet Heads 2.5 Section and Conventions 2.6 Set Screws 2.7 Machine Screws 2.8 Foundation Bolts, Keys	
	Text Books: 1. Engineering Drawing N D Bhatt 2. Machine Drawing N D Bhatt 3. Engineering Graphics V. Laxmi Narayan 4. Machine Drawing V. Laxmi Narayan 5. Engineering Drawing P S Gill 6. Machine Drawing M L Mathur Reference Books: 1. A Text Book of Machine Drawing Laxmi Narayana and Mathur, M/s. Jain Brothers, New Delhi.	

Workshop Practice – I		
Objective: This subject is designed to give basic knowledge of carpentry shop , fitting shop , welding shop & sheet metal shop with practical exposure.		
	List of Experiments	
	Carpentry Shop 1. Preparation of Cross-Half Lap Joint. 2. Preparation of Dovetail Joint 3. Preparation of Bridle Joint 4. Preparation of Mortise and Tenon Joint 5. Preparation of Mitre Joint 6. Demonstration of Job on Wooden Polishing Work Welding 7. Preparation of a Butt Joint by Gas Welding. 8. Preparation of Lap Joint by Electric arc Welding. 9. Preparation of T-Joint by Electric arc Welding. 10. Demonstration on Brazing by the Instructor. 11. Demonstration on Soldering. 12. Demonstration on Gas Cutting.	
Suggested Text Books : 1. Workshop Technology Gupta & Malani 2. Workshop Technology Kumar & Mittal 3. Workshop Technology Hajra, Chaudhary Suggested Reference Books: 1 Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.		

Semester-II		
2D01: Applied Chemistry-II		(L:T:P:- 3:1:0)
Objective: The reactions & synthesis procedures of materials like water analysis, chemical kinetics, corrosion and basic chemistry (IUPAC) behind them will makes interesting the topic & improve the research ability with their wide ideas.		
Unit	Topic	36 Hours
Unit – I	Fuels: Definition, Classification, Calorific Value (HCV and LCV) and Numerical Problems on Calorific Value, Combustion of Fuels, Numerical Problems on Combustion Solid Fuels: Coal and Coke Liquid Fuels: Petroleum and its Distillation Cracking, Octane and Cetane Values of Liquid Fuels Synthetic Petrol, Power Alcohol Bio-Gas, Nuclear Fuels – Introduction to Fission and Fusion Reactions.	9
Unit – II	Corrosion: Definition Theories of Corrosion: Acid Theory (Rusting) , Direct Chemical Corrosion or Dry Corrosion, Wet Corrosion or Electro-Chemical Corrosion (Galvanic and Concentration Cell Corrosion) Various Methods for Protection from Corrosion	9
Unit – III	Polymers: Definition Plastics: Classification, Constituents, Preparation, Properties and Uses of Polythene, Bakelite Terylene and Nylon. Rubber: Natural Rubber, Vulcanisation ,Synthetic Rubbers - Buna - N, Buna-S, Butyl and Neoprene	9
Unit – IV	Cement and Glass: Manufacturing of Portland Cement, Chemistry of Setting and Hardening of Cement, Glass : Preparation, Varieties and Uses. Lubricants: Definition, Classification Properties of Lubricants : Viscosity, Oiliness, Flash Point, Fire Point, Acid Value, Saponification, Emulsification, Cloud and Pour Point.,Artificial Lubricants	9
Unit-V	Miscellaneous Materials: Refractories : Definition, Classification and Properties Abrasives : Natural and Synthetic Abrasives, Paint and Varnish : Definition and Function of Constituents, Soap and Detergents : Definition, Properties and Uses 15. New Engineering Materials: (Brief Idea of Following) Superconductors, Organic Electronic Materials Fullerenes Optical Fibres	6
Text Books 1. Practical Chemistry for Engineers Virendra Singh (Hindi) 2. Hand book of Technical Analysis Bannerji Jain Bros.Jodhpur 3. Engineering Chemistry-I(Hindi) Mathur & Agrawal. 4.. Inorganic Chemistry Shivhare & Lavania Suggested Reference Books: 1 Engineering Chemistry, Jain & Jain, Dhanpat Rai 2 Engineering Chemistry, M.M. Uppal		

2D02: Applied Physics-II		(L:T:P:-3:1:0)
Objective: physics is combined with problem solving and engineering skills, which then has broad applications. Career paths for Engineering physics is usually (broadly) "engineering, applied science or applied physics through research, teaching or entrepreneurial engineering".		
Unit	Topic	38 Hours
Unit – I	A.C. Circuits: Faraday's Laws of Electro Magnetic Induction, Lenz's Law Self and Mutual Inductance Alternating Current, Phase & Phase Difference, Instantaneous, Average and rms value of AC, Behaviour of Resistance, Capacitance and Inductance in an AC Circuit, AC Circuits Containing, R-L, R-C and LCR in Series ,Power in AC Circuit and Power Factor,Choke Coil	9
Unit – II	Semi Conductor Physics: Energy Bands in Conductor, Semi Conductor & Insulator, Chemical Bonds in Semiconductor, Intrinsic and Extrinsic Semiconductors,PN-Junction Diode, Working, Biasing and Characteristics Curves,Zener Diode and Voltage Regulation using it, Half Wave & Full Wave Rectifiers (only working, no derivations),Junction Transistors, Working, Biasing and Characteristic Curves, Brief Idea of Using Transistors as an Amplifier (without mathematical analysis)	10
Unit – III	Modern Physics: Photo Electric Effect, Einstein's Equation, Photo Cells, Lasers: Stimulated Emission and Population Inversion, Types of Laser - Helium Neon and Ruby Laser, Application of Lasers (brief idea only),Material Processing, Lasers in Communication Medical Applications	10
Unit – IV	Nuclear Physics: Idea of Nuclear Force, Mass - Defect and Binding Energy, Nuclear Reactions, Natural and Artificial Radioactivity , Law of Radioactive Disintegration Half Life & Mean Life, Idea of Nuclear Fission and Fusion. Chain Reaction,Nuclear Reactor	9
Unit -V	Pollution and its control: Introduction to Pollution – Water, Air, Soil , Noise, Nuclear and mental pollution, Types of Pollution , Brief idea about Noise Pollution and its Control, Nuclear Hazards, Nuclear Waste Management	7
Suggested Text : 1.A Text Book of Applied Physics N.S. Kumar (Hindi) 2.Principles of Physics Brijlal, Subhramanyam 3.Applied Physics Vol.-II Hari Harlal, NITTTR Reference Books: 1 A Text Book of Applied Physics N.S. Kumar 2 Principles of Physics Brijlal, Subhramanyam		

2D03: Applied Mathematics-II		(L:T:P:-4:1:0)
Objective: Engineering mathematics is a branch of mathematics that concerns itself with mathematical methods that are typically used in science, engineering, business, and industry. Thus, "applied mathematics" is a mathematical science with specialized knowledge.		
Unit	Topic	38 Hours
Unit – I	Limits: Concept of Limit, L.H.L., R.H.L., Limit of Standard Functions , Concept of Continuity and Differentiability at a Point (simple Problems) Function: Definition of Function, Range and Domain of Function, Types of Function, Absolute Value Function, Exponential value Function, Identity Function, Reciprocal Function, Rational and Irrational Function, Increasing and decreasing Function	10
Unit – II	Differential Calculus : Standard Formulae (Except Hyperbolic Function), Derivative of Sum, difference, Multiplication and Division of two Functions, Differentiation of Function of a Function, Logarithmic Differentiation, Differentiation of Implicit Functions, Differentiation of Parametric Functions, Differentiation by Trigonometric Transformations, Differentiation of a Function w.r.t. Another Function, Second Order Derivative Applications of Differential Calculus: Geometrical meaning of dy / dx . Tangents and Normals , Angle of Intersection between two Curves, Derivative as a Rate Measurer, Errors and Approximations, Maxima and Minima of Function with one Variable	10
Unit – III	Integral Calculus: General Introduction of Integral Calculus, Integration of Sum and difference of Functions, Integration by Simplification, Integration by Substitution Integration by Parts, Integration of Rational and Irrational Functions, Additional standard Cformulae, Integration of Trigonometric Functions, Definite Integral and its Properties.	10
Unit – IV	COORDINATE GEOMETRY Straight Lines: Differential Equations: Definition of differential Equation. Order, Degree and Solution of a differential Equation. Solution of a differential Equation of First Order and First Degree using, Variable Separable Method, Homogenous Form, Reducible to Homogenous Form, Linear differential Equation Bernoulli's Equation, Exact differential Equation, Substitution Method, Solution of Linear Differential Equation of Higher order with Constant Coefficients Applications of Differential Equations to L-R, L-C, L-C-R ,Circuits of Standard Forms	8
Unit-V	Vector Algebra: Definition, Addition and Subtraction of Vectors Scalar and Vector Product of two Vectors Scalar Triple Product and Vector Triple Product , Applications of Vectors in Engineering Problems Numerical Integration : Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Newton - Raphson Rule	5
Suggested Text 1. Text Book on Differential Calculus Chandrika Prasad (Hindi) 2. Text Book on Integral Calculus Chandrika Prasad 3. Differential Calculus M. Ray, S. S. Seth, & G. C. Sharma 4. Integral Calculus M. Ray, S. S. Seth, & G. C. Sharma Reference Books: 1. Integral Calculus, M.Ray, S.S.Seth&G.C.sharma. 2. Vector Calculus, R.Kumar.		

2D04:Electrical & Electronics Technology		(L:T:P:-3:1:0)
Objective: At the end of the course the student will be able to gauge various fundamentals aspects of Basic Electrical and Electronics engineering covering networks theory, single and three phase circuits, transformers and dc machines. Also it will impart knowledge about transistors and thyristor.		
Unit	Topic	36 Hours
Unit – I	DC Networks : Resistance, inductance, capacitance, current, voltage, power, Ohms law, Kirchhoff's Laws, Node Voltage and Mesh Current Analysis; Delta-Star and Star-Delta Transformation, Source Conversion. Classification of Network Elements, Superposition Theorem, Thevenin's Theorem.	10
Unit – II	Single Phase AC Circuits : Generation of Single Phase AC Voltage, EMF Equation, Average, RMS and Effective Values. RLC Series, Parallel and Series- Parallel Circuits, Complex Representation of Impedances. Phasor Diagram, Power and Power Factor. Three Phase A.C. Circuits : Generation of Three-Phase AC Voltage, Delta and Star-Connection, Line & Phase Quantities, 3-Phase Balanced Circuits, Measurement of Power in Three Phase Balanced Circuits.	10
Unit – III	Transformer : Faraday's Law of Electromagnetic Induction, Construction and Operation of Single Phase Transformer, EMF Equation, Voltage & Current Relationship and Phasor Diagram of Ideal Transformer.	8
Unit – IV	Transistor: Bipolar Junction Transistor, Transistor Current Components, Characteristics of CE, CB and CC Transistor Amplifiers. Thyristors: Diode and VI characteristic, four layer diode, Bi-directional thyristors.	8
Suggested Text /: 1. Sahdev – Basic Electrical and Electronics Engg. J.B.Gupta – Basic Electrical and Electronics Engg.(Hindi) 2. 3. B.L. Thareja- Electrical Technology-Vol I Reference Readings 1.H.P. Tiwari – Electrical and Electronics Engg. 2. Basic Electrical and Electronics Engg, Tata Mcgraw Hill		

2D05: Applied Mechanics		(L:T:P:-3:1:0)
Objective: This subject is design to give the basic knowledge of equilibrium of forces, center of gravity, centroid, moment of inertia and concept and application of work power energy.		
Unit	Topic	38 Hours
Unit – I	Force: Definition, Units, Different Types of Forces. Coplanar Forces: Resolution of Forces, Law of Parallelogram of Forces, Resultant of two or more Forces, Basic Conditions of Equilibrium, Lami's Theorem (No Proof), Jib Crane, Law of Polygon of Forces (Only Statement) Moment: Definition, Units & Sign Convention., Principle of Moments, Application of Equilibrium Conditions for non-concurrent Forces	10
Unit – II	Application of Principles of Forces & Moments: Levers & their Types., Reactions of Simply Supported Beams (Graphical & Analytical Method), Steel Yard .,Lever Safety Valve Foundry Crane Centre of Gravity: Concept, Centroid, Calculation of C.G. of Regular Bodies, Calculation of C.G. of Plain Geometrical Figures Friction: Types of Friction, Laws of Friction, Angle of Friction, Angle of Repose, Friction on Horizontal and Inclined Plains, Application of Laws of Friction Related to Wedge, Ladder and Screw Jack.	10
Unit – III	Simple Machines: Basic Concepts, Loss in Friction, Inclined Plane, Simple & Differential Wheel and Axle (Neglecting Rope thickness) Screw Jack Lifting Crabs Systems of Pulleys, Worm and Worm Wheel Rectilinear Motion: Concept, Motion under Constant Velocity, Motion under Constant Acceleration, Velocity-time graph and its uses	10
Unit – IV	Impact and Collision: Concept, Impulse and Impulsive Force, Law of Conservation of Momentum, Collision Between Two Rigid Bodies, Newton's Experimental Law of Collision, Coefficient of Restitution	5
Unit-V	Motion under Gravity: Concept, Vertical Motion, Smooth Inclined Plane Projectiles: Concept, Range, Maximum Height and Time of Flight, Equation of Trajectory Calculation of Velocity of Projectile at Certain Height, And at Certain instant. Newton's Laws of Motion: Definitions, Momentum and it's Unit,Application of Second Law of Motion	8
Suggested Text Books 1. Engineering Mechanics by, RK Rajpoot (Hindi) 2. Engineering Mechanics by, RS Khurmi 3. Engineering Mechanics By Chitranjan Aggarwal		
Suggested Reference Books 1. Engineering Mechanics by Nelson , Tata Mcgraw Hill 2. Engineering Mechanics by Shailesh Kumar		

2D06:Applied Chemistry Lab-II		(L:T:P:-0:0:2)
Objective: Develop the ability of students to carry out experiments, collect and interpret data, and critically report results through "hands-on" laboratory experiences.		
	List of Experiments	
	1. Determination of the Strength of Copper Sulphate Solution using a Standard Solution of thio Sulphate. 2. Determination of pH Values of Given Samples. 3. Determination of Hardness of Water by EDTA Method. 4. Estimation of Free Chlorine in Water. 5. Determination of Acid Value of an Oil. 6. Preparation of Soap. 7. To determine the Viscosity & Viscosity Index of a given lubricating oil by Redwood Viscometer No. 1	
Text Books: 1. Engineering Chemistry , Mathur and Aggarwal 2. A text Book of Engineering Chemistry , S.K. Jain & K.D. Gupta Reference Books: 1. Practical Chemistry For Engineers , Dr. Renu Gupta & Dr. Sapna Dubey		

2D07: Applied Physics Lab-II		(L:T:P:-0:0:2)
Objective: This lab is to help the student to understand the concept of Diode, PN junctions, Half deflection method and the concept of cells .		
	List of Experiments	
	1. To Determine Acceleration due to Gravity using Simple Pendulum. 2. To Verify Newton's Law of Cooling. 3.. To Verify Law of Resistances. 4. To Determine Specific Resistance of Material using Meter Bridge. 5. To Determine Internal Resistance of a Primary Cell using Potentiometer. 6. To Compare emf of two Primary Cells using a Potentiometer. 7. To Draw Characteristic Curves of PN Diode and Determine its Static and Dynamic Resistance. 8. To Draw Characteristic Curves of a PNP/NPN Transistor in CB/CE Configuration. 9.. To Measure Resistance of a Galvanometer by Half-Deflection Metho	
Text Book: 1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH) 2. Practical Physics – S.L.Gupta&V.Kumar (PragatiPrakashan). Reference Books: 1.. Advanced Practical Physics Vol.I& II – Chauhan& Singh (PragatiPrakashan)		

2D08: Electrical & Electronics Workshop		(L:T:P:-0:0:2)
Objective: this lab will help the students learn about key and basic electrical devices and apparatus used in day-to-day life. Also this will be useful in gaining knowledge about house hold electrical circuits.		
	List of Experiments	
	<div>1. Study of Symbol, Specification and Approximate Cost of Common Electrical Accessories, Tools and Wires & Cables Required for Domestic Installation. Study of : 2.1 Basic Electricity Rules for a Domestic Consumer 2.2 Safety Precautions & use of Fire Fighting Equipments 3. Use of series of Phase Tester, Series Test Lamp, Tong Tester and Megger in Testing of Electrical Installation. 4. 4.1 Prepare a Potential Divider and Measure Resistance of a Filament Lamp Using Voltmeter and Ammeter. 4.2 Measurement of Power and Energy Consumption by an Electric Heater using Watt Meter and Energy Meter. 5. Preparation of Wiring Diagram, Wiring, Testing, Fault Finding & Costing for : 5.1 Control of one Lamp by one Switch (using Batten and Tumbler Switch) 5.2 Control of Stair Case Wiring (using Casing Capping, CFL and Flush Type Switches) 5.3 Control of one Bell Buzzer and Indicator by one Switch (using Conduit and Flush type Switch) 6. Prepare one Switch Board as per Institutional Requirement (using Flush type Switches, Sockets, MCB, ELCB, Etc.) 7. Study, Connecting, Testing and Fault Finding of 7.1 Fluorescent Tube and its Accessories 7.2 Ceiling Fan with resistance type and Electronic Regulator 8. Study, Functioning, Fault Finding & Repairing of following Domestic Appliances - 8.1 Automatic Electric Iron 8.2 Air Cooler 8.3 Electric Water Pump 9. Design, Draw and Estimate the Material required for Installation For a small Residential Building/ Office/ Hall. Identification of following Resistors and finding their Values: 1.1 Carbon and Metal Film 1.2 Variable Resistance Log and Linear 1.3 Semi Variable Preset of One Turn & Multiturn 2. Identification of following Capacitor and finding their Values: 2.1 Mica 2.2 Ceramic 2.3 Polysterene 2.4 Electrolytic 2.5 Tantalum 3. Identification of following Switches and Study of their Working Mechanism: 3.1 Toggel 3.2 Bandswitkeh 3.3 Rotary 3.4 Push to on and off 3.5 Press to on and off 4. Identification and Testing of following type of Connectors: 4.1 Rack and Panel 4.2 Printed Circuit Edge 4.3 Coaxial</div>	

	<p>4.4 Tape & Ribbon</p> <p>4.5 Plate</p> <p>5. Study of Different Relays and their Contacts.</p> <p>6. Study of following Tools used in Electronic Workshop:</p> <p>6.1 Component Lead Cutter</p> <p>6.2 Wire Strippers</p> <p>6.3 Soldering Iron & Soldering Station</p> <p>6.4 De-Solder Pump</p> <p>7. Measurement of Voltage, Current and Resistance using Analog & Digital Millimeter.</p> <p>8. Testing of Electronic, Component such as Capacitor, Inductor, Diode and Transistor.</p> <p>9. Measurement of Amplitude & Frequency of a Signal using CRO.</p> <p>10. Verification of Ohm's law using Resistive Circuit and Analog Meters.</p> <p>11. Soldering of different passive component combination on general purpose PCB.</p> <p>12. Sketching of different Electronic Components Symbol on Drawing</p>	
<p>Text Books :</p> <p>Electrical Workshop M.L. Gupta</p> <p>2. Domestic Devices & Appliances K.B. Bhatia</p> <p>3. Electrical Workshop S.L. Uppal</p> <p>4. Electrical Component & Shop Practice K.R. Nahar</p> <p>5. Maintenance of Electrical Equipments K. S. Janwal</p> <p>6. Hand Book of Philips Component</p> <p>Reference Books:</p> <p>1. Electrical Components and Shop Practice ,K.R. Nahar</p>		

2D09: Workshop Practice -II		(L:T:P:-0:0:2)
Objective: This Lab is design to give practical exposure of engineering workshop in different shop like smithy shop, machine shop, foundry shop, and student should be able to understand different types of tool, material and measuring instrument and their application.		
	List of Experiments	
	<p>Sheet Metal Shop:</p> <p>Preparation of following utility Jobs Involving Various Sheet Metal Joints (Single and Double Hem Joints, Wired Edge, Lap Joint Grooved Seam Joint, Single and Double Seam Joint) and Exercises (Soldering and Riveting Joints)</p> <p>1 Preparation of a Soap Tray & Mug 2. Preparation of Funnel</p> <p>Fitting and Plumbing Shop</p> <p>1. Marking Filing & Hack Sawing Practice. 2. Production of Utility Job involving Marking, Filing and Hack Sawing. 3. Production of Utility Job involving Marking, Filing and Hack Sawing Drilling and Tapping. 4. Cutting and Threading on G.I. Pipe 5. Exercise on PVC Pipe Fitting. 6. Repair of Taps and Cocks.</p>	
Suggested Text Books : <ol style="list-style-type: none"> 1 Workshop Technology B.S. Raghuwanshi 2. Workshop Technology (Hindi) Tahil Maghnani 3. Workshop Technology (Hindi) Vinay Kumar 4. Domestic Devices and Appliances K.B. Bhatia <p>Suggested Reference Books:</p> <ol style="list-style-type: none"> 1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers 		

2D10 : Computer Fundamental & IT Lab-II		(L:T:P:-0:0:2)
Objective: This lab is designed so that the better presentations and documents could be made by the students. It comprises the M.S. Excel, M.S. and powerpoint presentations.		
	List of Experiments	
	<ol style="list-style-type: none"> 1. Visit to Internet Site 2. Creating e-mail Account , Sending and Receiving e-mails. 3. Sending e-mail with Attachment & Signature 4. Searching Web Page/ Site using Search Engine (eg. google.com, yahoo.com, altavista.com etc.) 5. Exercise Based on MS-Word: <ol style="list-style-type: none"> 5.1 Document Preparation 5.2 Printing Document 5.3 Mail Merge usage 5.4 Draw Table 6. Exercise Based on Ms-Excel : <ol style="list-style-type: none"> 6.1 Work Book Preparation 6.2 Printing Workbook 6.3 Data-base usage 6.4 Draw Charts 7. Exercise Based on Power Point : <ol style="list-style-type: none"> 7.1 Creating Slide 7.2 Adding, Animations in Slide 7.3 Running Slide 8. Creating Simple Web Page using HTML. 	
Suggested Text Books: <ol style="list-style-type: none"> 1. Yadav DS, Foundations of IT, New Age, Delhi. 2.Curtin, Information Technology: Breaking News, Tata Mo Grew Hill. Suggested Reference Books: <ol style="list-style-type: none"> 1.Nelson, Data Compression, BPB. 		

SEMSTER – 3			
3DAE01: Workshop Technology & Metrology -I -	L:T:P	3:0:0	36
	Objective: This Subject is designed to give the basic knowledge of cutting tool materials and machine tool and study about lathe and drilling machine. Student should also be able to understand different measuring instrument in metrology.		
Unit –I	Cutting Tools and Materials:- Types Cutting tools, shape of single point tool, Cutting angles, effect of rake angle, importance of clearance angle ,Heat produced by cutting and its effect ,Cutting speed, feed and depth of cut ,Materials ,Materials of cutting tools and their properties ,High-speed steel, cobalt steel, tungsten carbide, cemented carbide, satellite, diamond, ceramics etc.		7
Unit –II	Centre Lathe: The centre lathe and its principle of working. Types of lathes, Lathe specification and size, Features of lathe bed. Head stock and tail stock. Feed mechanism and change-gears, carriage saddle, Cross slide, Compound rest, Tools post, Apron mechanism, lathe accessories, Chucks, Face plate, Angle plate, Driving plate, Lathe dogs, mandrills, Steady rest, Lathe attachments. Lathe operations-plane and step turning, Taper turning, Screw cutting, Drilling, Boring, reaming, Knurling, Parting off, Under cutting, Relieving. Types of lathe tools and their uses. Brief description of semi automatic and automatic lathes such as capstan and turret lathes, their advantages and disadvantages over centre lathe, types of job done on them. General and periodic maintained of a centre lathe.		8
Unit –III	Drilling & Boring Machines: Types of tools used in drilling and boring. Classification of drilling and boring machines, principle of working and constructional details of simple and radial drilling M/C and general and periodic maintenance. Operations like facing, counter boring, tapering.		7
Unit –IV	Metrology: Units and standards of measurement, International, National and company standards Line and end standards, Errors in measurement, Precision and accuracy Linear and Angular Measurement: Vernier caliper, micrometers, height and depth gauges, Bevel protractor, sine bar, slip gauges, angle gauges and clinometers Auto collimator, angle dekkar, Taper measurements, Cylinder bore gauge, Telescopic gauge, feeler and wire gauge. Measurement of Surface Finish : Meaning of surface texture, primary and secondary texture, Terminology of surface roughness, Factors affecting surface finish, Representation of surface roughness parameters CLA and RMS values, Comparison and direct instrument methods of surface finish measurements.		7
Unit –V	Comparators:- General principles of constructions, balancing and graduation of measuring instruments, characteristics of comparators, use of comparators, difference between comparators, limit gauges and measuring instruments. Classification of comparators, construction and working of dial indicator, Johansson "Mikrokator", read type mechanical comparator, mechanical-optical, zeos opt test, electro limit, electromechanical, electronics pneumatic comparators, gauges, tool makers microscope. Light Wave Interference: Principle of interference, Interferometer applied to flatness testing, N.P.L. flatness interferometer.		7
	Text book:- <ol style="list-style-type: none"> 1. Workshop Technology (Hindi) - II Tahl Manghnani 2. Workshop Technology - II Hazra & Chaudhary. 3. Workshop Technology (Hindi) S.K.Bhatnagar 4. Production Technology R.K. Jain 5. Engineering Metrology R.K.Jain 6. Engineering Metrology (Hindi) Mittal 		

	Reference Book:- <ol style="list-style-type: none">1. Engineering Metrology (Hindi) Bhatnagar.2. All About M/C Tools Gerling	
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3DAE02: ENGINEERING MATERIAL & PROCESSES		L:T:P	3:0:0	36
	Objective:- This subject is design to teach them basics of metal structure, properties, usage and testing of various ferrous and nonferrous materials and various heat treatment processes. This subject aim at developing knowledge about characteristics, testing and usage of various types of materials used in mechanical engineering industry. Student should also be able to understand about welding processes and foundry shop.			
Unit –I	Engineering Materials & Crystal Structure:- Introduction to engineering materials ,Classification of materials ,Thermal, chemical, electrical, mechanical properties of various materials ,Selection criteria for use in industry. Metal structure ,Arrangement of atoms in metals ,Crystalline structure of metals ,Crystal imperfections , Deformation of metal, Classification of iron and steel ,Sources of Iron ore and its availability,Manufacture of pig iron, wrought iron, cast iron and steel ,Effect of various alloying elements on steel, Important ores and properties of aluminum, copper, zinc, tin, lead .Properties and uses of nonferrous alloys.			7
Unit –II	Engineering Plastics and Fibers : Introduction and use of plastics and fibers , Classification of plastic (Thermoplastic and thermosetting) ,Classification of fibers (Inorganic and organic fibers) Insulating Materials:- Various heat insulating material like asbestos, glass, wool thermocouple, cork, puf, china clay and their use.			7
Unit –III	Testing of Metals and Alloys :- Identification tests : appearance, sound, spark, weight, magnetic, microstructure, filing Heat Treatment Of Metals: Elementary concept, purpose, Iron-carbon equilibrium diagram. T.T.T. or 'S' curve in steels and its significance, micro structure of steels and martens tic transformation (elementary idea). Hardening, Tempering, Annealing, Normalizing and case hardening. Ageing, Various temperatures ranges for different metals and alloy (From heat treatment hand book).			7
Unit –IV	Welding Processes -Weld edge preparation, Introduction to various welding processes with procedure equipments and applications such as Electric arc welding.,Resistance welding-Spot welding, Flash butt, Percussion welding., Thermit welding., Carbon arc welding, Metal-Inert-Gas welding (MIG)., Tungsten arc welding (TIG)., Atomic Hydrogen arc welding., Stud welding., Laser Beam, Electron Beam Welding, Explosion Welding, Ultrasonic Welding., Under water welding, Submerged Arc welding			8
Unit –V	Advanced Welding Process: Atomic hydrogen, ultrasonic, plasma and laser beam welding, electron beam welding, and special welding processes e.g. TIG, MIG, friction and explosive welding, welding of C.I. and Al, welding defects. Electrodes and Electrode Coatings Foundry Pattern: The pattern materials used, Types of patterns, Allowances and pattern layout, Color scheme pattern defects, Types of cores and their utility. Molding Processes:- Classification of mould materials according to characteristics, Types of sands and their important test, parting powders and liquids. Sand mixing and preparation Moulding defects, Types of Casting defects.			7
Text Book : 1 Material Science & Engineering – R.K. Rajput 2 A Text Book of Material Science & Metallurgy – O.P. Khanna, Dhanpat Rai & Sons 3 Material science & engineering by Navneet Gupta : Dhanpat rai and sons REFERENCE BOOKS : 1 Manufacturing Process - I R.K. Yadav. 2. Material Science - Narula, Narula and Gupta. New Age Publisher				

3DAE03: Basic Automobile Engineering		L:T:P	3:0:0	36
	Objective: This subject is design to give the basic knowledge of Automobile engineering component, Transmission system, Braking system, wheel & Tyres used in automobile.			
Unit –I	Introduction:- Classification of Automobiles ,Chassis and body, Components of vehicle – basic structure, power unit, transmission system, accessories, superstructure. ,(Basic functions and arrangements) ,Layout of conventional type vehicle (front engine rear wheel drive) ,Vehicle dimensions – wheel base, wheel track, front & rear overhang, overall dimensions, minimum ,ground clearance, minimum turning radius. Suspension System: - Function of suspension system. Types of suspension systems, Working of leaf springs, Coil springs. Shock absorbers, Torsion bar suspension and stabilizers.			6
Unit –II	Braking Systems :- Construction details and working of mechanical, Hydraulic and Vacuum breaks, disc brake, air brake, Introduction to power brake. Details of master Cylinder, Wheel cylinders , Concept of brake drum and brake linings and brake adjustment. Wheels and Tyres:- Sizes of tyres used in Indian vehicles, over inflation, under Inflation and their effect. Causes of tyre wear, tyre retreading, idea of Toe in, Toe out, Camber, Caster, King pin inclination. Advantages of tube less types over types with tubes.Wheel alignment and balancing, Type rotation, Difference between radial and cross ply.			8
Unit –III	Front axle and Steering System:- Front axle - types and construction, front wheel stub axle assembly , Purpose and requirements of steering system ,General arrangement of steering systems steering gear ratio. Steering System: - Its function, Principle of steering. Ackerman and Davis steering gears, Steering gear types, Worm and nut, Worm and wheel, Worm and roller, Rack and pinion type. Concept of steering system commonly used in Indian Vehicles. Concept of steering locking assembly, introduction to power steering.			8
Unit –IV	Power Transmission System :- a) Clutch:- Function of clutch in an auto mobile, Construction detail of single plate and multi plate friction clutches, Centrifugal and semi centrifugal clutch. Construction and working of fluid flywheel. (b) Gear Box:- Its function, Assembly detail and working of sliding Mesh, constant mesh, Synchromesh and epicyclical gear boxes. Simple concept of over drive, overrunning clutch, transfer case and torque converter. (c) Propeller Shaft:- Its function, Universal joint and slip joint, Hotchkiss drive and Torque tube drive. (d) Final Drives:- Concept of tail pinion, Crown wheel, Differential type rear axle.			8
Unit –V	Frame and Body:- Frame ,Function of frame, loads or frame ,Frame construction, sub-frame ,Defects in frame chassis repair and alignment ,Frame less construction Body ,Types and construction (parts of body) ,Main features – strength, stiffness, space air drag, stream lining , weight, vibration, protection ,Against weather, corrosion, safety and economy considerations. ,Body alignment ,Bumpers ,types and functions			6
Text Book; 1.Kirpal, Singh., "Automobile Engineering", Vol 1 and 2, Standard Publishers Distributors (Hindi & English) 2. Basic Automobile Engineering C.P.Nakra. 3. Automobile Engineering By SM Panday, Deepak publisher ltd. 4. Automotive Chassis & Body. P.L.Kohli. Reference books: 4. Automobile Engineering. T.R.Banga & Nathu Singh. 5. Automobile Engineering H.S. Reya				

3DAE04: THERMODYNAMICS & IC Engines		L:T:P	3:1:0	36
	Objective :- At the end of the course the students will be able to analyze and evaluate various thermodynamic cycles used for energy production, work and heat, within the natural limits of conversion. Student should also be able to understand about IC Engine ,Gas turbine and compressor.			
Unit –I	Basic Concept and Gas Laws :- Thermodynamics, property-Intensive and Extensive, system - open, closed and isolated ,Energy - Internal energy, potential energy, kinetic energy, heat,work, specific heat, enthalpy ,Boyle's law, Charle's law, Joule's law Characteristics gas equation, gas constant, mol, universal gas constant and molar specific heats ,Simple numerical problems. Laws of Thermodynamics:- Zeroth law of thermodynamics ,First law of thermodynamics,Constant volume, constant pressure, isothermal, adiabatic polytropic processes, throttling and free, expansion, work done during these processes. ,Simple numerical problems Second law of thermodynamic: concept of perpetual motion machine of first order and that of second order. Concept of heat engine, heat pump and refrigerator. Carnot cycle efficiency for heat engine and cop for refrigerator and heat pump. Entropy: its physical concept and significance, reversibility and efficiency, Irreversibility and entropy. Expression for change of entropy in various thermodynamic processes. Simple numerical problems concerning Concept of Available and unavailable energy.			7
Unit –II	Property of steam :- Generation of steam at constant pressure, various stage of steam- wet steam, dry steam saturated steam,dryness fraction, super heated steam, degree of super heat.,Critical point, triple point, thermodynamic properties of steam - specific volume, specific enthalpy, specific internal energy, specific entropy,Steam property diagram: temperature - entropy diagram, enthalpy- entropy diagram, pressure enthalpy diagram ,Heating and expansion of steam during thermodynamic processes, Change of internal energy and entropy of steam during processes Simple numerical problems Use of steam tables and Mollier charts. Steam Generators:- Definition of boiler according to I.B.R., classification of boilers, Comparison of water tube and fire tube boilers. Special characteristics of high-pressure boilers Introduction to Indian Boiler Act. Boiler Performance:- Actual evaporation, Equivalent evaporation, Factor of evaporation, Boiler efficiency Heat losses in boiler plants, Boiler power, Energy balance sheet of boiler. Simple numerical problems			6
Unit –III	Gas Power Cycles:- Otto cycle, Diesel cycle, Dual combustion cycle, Atkinson cycle, Joule / Brayton cycle ,Air standard efficiency ,Effect of compression ratio on efficiency ,Numerical Problems Principles of Internal Combustion Engines:- Introduction and Classification of I.C Engines ,Working principle of four stroke and two stroke cycle and their comparison ,Working and special features of petrol and diesel engines and their comparison and applications ,I.C. engine terms - Bore, stroke, dead centres, crank throw, compression ratio, clearance volume, piston ,displacement and piston speed ,Valve timing diagrams (Theoretical & Actual), firing order ,Super charging of I.C. engines			8
Unit –IV	Petrol Engines :- Concept of Carburation, Air fuel ratio ,Simple carburetors and its limitations ,Description of Solex carburetors ,Multi point fuel injection system Mechanical and electrical feed pump ,Description of coil ignition system and Magneto ignition system Diesel Engines:- Description and working of Fuel feed pump ,Injection of fuel, air and airless injection and fuel injectors ,Introduction to swirl and open combustion ,chambers Cooling, Lubrication and Governing:- Necessity of engine cooling, Properties of coolants, Methods of cooling and their merits and demerits, Function of Lubrication, lubrication systems of I.C. Engines, Properties of lubricants .Governing methods of I.C. Engines.			8
Unit- V	I.C. Engines Performance:- Introduction to basic performance parameters ,Measurement of brake power by rope brake, prony brake and hydraulic dynamometer ,Measurement of Indicated power by engine indicator and Morse test method. ,Energy balance sheet of I.C. engines and finding various efficiencies ,Numerical problems Gas Turbines :- Classification and application of gas turbines ,Description of constant pressure (open cycle and closed cycle) and constant volume gas turbines. ,Methods of increasing thermal efficiency of gas turbines, regeneration, inter cooling, re-heating.			7

	Air Compressors:- Classification of compressors, uses of compressed air ,Description of single stage and multi stage reciprocating compressors ,P.V. diagram of single and multi stage reciprocating compressor with inter cooling ,Description of rotary and centrifugal compressors.	
Text Book: 1. Thermal Engineering (Hindi) Verma & Gulecha 2. Thermal Engineering Vol.1 Mathur & Mehta. 4. Thermal Engineering R.S. Khurmi 6. Internal Combustion Engine Mathur & Sharma		
Reference Book: 1. Thermodynamics by D S KUMAR : Kataria and sons 2. Thermodynamics by P K Nag: TMH publications.		

3DAE05: FLUID MECHANICS & MACHINE			L:T:P	3:1:0	36
	Objective: The student should be able to understand fundamental of fluid, fluid statics and fluid kinematics, and knowledge of buoyancy and study of flow measuring devices, flow through pipes and fluid machines.				
Unit –I	Introduction:- Introduction concepts ,Fluids and solids ,Liquid, gas and vapour ,Fluid mechanics , Kinematics ,Dynamics , Fluid properties ,Density ,Specific volume ,Specific gravity ,Viscosity ,Newton's law of Viscosity ,Dynamic and Kinematic Viscosity ,Compressibility ,Surface tension - soap bubble, drop , Capillarity , Vapour pressure and its importance Fluid Pressure and its Measurement: Definition and its units ,Pascal's law ,Intensity of pressure at a point in fluid at rest ,Pressure head ,Pressure Atmospheric pressure ,Gauge pressure ,Vacuum pressure ,Absolute pressure ,Differentials pressure ,Law of hydrostatic pressure ,Brahma's press ,Pressure measurement ,Manometers ,Piezometer - its limitation ,U-tube - simple, differential, inverted ,Micro-manometers ,Inclined tube micro-manometers ,Mechanical gauge ,Bourdon gauge ,Bellow gauge ,Diaphragm gauge ,Dead weight gauge.	7			
Unit –II	Hydrostatics:- Total pressure ,Centre of pressure ,Total pressure and center of pressure in following cases ,Plane surface immersed horizontally ,Plane surface immersed vertically ,Plane surface immersed at an angle ,Curved surface ,Working of lock gates, sluice gate ,Pressure on masonry dams of rectangular and trapezoidal sections and their condition of stability Hydro kinematics :- Description of fluid flow ,Eular approach ,Lagrangian approach Definition of path line, stream line ,Types of flow ,Steady - Non steady ,Uniform - Non uniform ,Laminar – Turbulent ,One, Two, Three dimensional flow ,Continuity equation (no proof) : ,Assumption ,Rate of discharge ,For one dimensional flow Hydrodynamics and Measurement of Flow:- Energy of fluid - pressure, kinetic and potential ,Bernoulli's theorem ,Assumptions and its limitation ,Conversion of pressure into pressure head, velocity into kinetic head ,Applications of Bernoulli's theorem Pitot-tube ,Venturimeter ,Orificemeter. Orifices:- Definition and classification ,Discharge through small orifices ,Coefficient of contraction , Coefficient of velocity ,Coefficient of discharge ,Coefficient of resistance ,Time of emptying a vessel of uniform cross section through an orifice at bottom..	7			
Unit –III	Analysis of pipe flow: Establishment of flow, energy losses in pipe lines, concept of equivalent length, flow through branches, by-pass, siphon, multiple pipe systems, water hammer. Impact of Free Jet:- Impulse momentum equation ,Force exerted by a fluid jet on stationery flat plate & moving plate. Force exerted by fluid jet on stationary curved vane, Jet strikes at the centre of symmetrical cured vane, Jet strikes tangentially at one, Force exerted by a fluid jet on moving curved vane.	7			
Unit –IV	Hydraulic Turbines:- Classification of water turbines ,Pelton turbine ,Working principle ,Constructional features ,Francis turbine and Kaplan turbine ,Working principle ,Constructional features ,Draft tube ,Cavitation ,Governing of Turbines Need for governing ,Simple governing mechanism ,Surge tank ,Turbine performance Heads - gross, net ,Efficiency - Hydraulic, Mechanical, Volumetric, Overall ,Unit quantities ,Specific speed ,Introduction to characteristics curve ,Numerical problems on turbines	8			
Unit –V	Centrifugal Pump:- Introduction and working principles ,Advantages over reciprocating pump ,Classification ,Constructional features ,Mechanical manometric and overall efficiency ,Head of a pump - static, manometric ,Power required to drive the pump ,Losses in pump and efficiency ,Minimum stating speed ,Pumps in series and parallel ,Priming ,Description and working of multistage centrifugal pump, submersible, deepwell pump and gear pump , Numerical problems Reciprocating Pump :- Types of pump ,Main components and working ,Slip ,Percentage slip ,Negative slip ,Work down by a reciprocating pump ,Acceleration of piston , Its effect on velocity and pressure ,Air vessel ,Troubles in Reciprocating pump and their remedies. Numerical problems Miscellaneous Hydraulic Machines :- Description, working principle of following machines like Hydraulic accumulator ,Hydraulic intensifier ,Hydraulic press ,Hydraulic coupling and torque converter.	7			

Text Books :

- 1 **Fluid Mechanics by R.K bansal Laxmi Publication**
2. Fluid Mechanics & Machines R.S.Khurmi.
- 3 . Fluid Machines S.S. Ratan

Reference Books :

- 1 Hydraulics & Fluid Mechanics – Modi & Seth, Pub. - Standard Book House, N.Delhi
2. Fluid Mechanics and Fluid Power Engineering – D S Kumar, S K Kataria and Sons

3DAE06: Workshop Technology & Metrology lab I	L:T:P	0:0:3	
Objective: This Lab is designed to give practical exposure of welding and casting process using pattern.			
	<p>Workshop Technology:-</p> <ol style="list-style-type: none"> 1. Grinding of various types of single point cutting tool, 2. Simple exercise on Lathe Machine involving following operation, <ol style="list-style-type: none"> a. Simple turning, facing, step turning, Grooving and knurling and taper turning by compound rest, b. Facing, drilling, boring and step turning, parting off. , c. Taper turning by tails tock off set method , d. V threading, square threading and taper threading by attachment , e. utility job on lathe machine with an accuracy of ± 0.2 mm <p>Metrology: -</p> <ol style="list-style-type: none"> 6. Internal and External measurement with the vernier caliper , 7. Internal and External measurement with micrometer 8. Measurement with height and depth gauges. 9. Measurement with dial indicator using surface plate and accessories for A Flatness B.Concentricity 10. Measurement with combination set and bevels protractor , 11. Measurement of thread characteristics , 12. Study and use of slip gauges and limit gauges., 13. Internal and external taper measurement, 14.Measurement of angle with sine bar and slip gauges 15. Study and use of comparators and tool room microscopes. 		

3DAE07: ENGINEERING MATERIAL & PROCESSES LAB	L:T:P	0:0:2
1. Identification of different metals (ferrous & Non Ferrous) by various methods. (e.g. appearance, sound, spark, weight, magnetic, microstructure, filing , 2. Study of heat treatment furnace. 3. Study of metallurgical microscope., 4. Exercise of TIG welding 5. Exercise of MIG welding 6. Exercise on spot welding 7. Study of pattern making procedure. 8. Study of mold making procedure 9. Study of Cupola furnace 10. Study of thermocouple and pyrometer. 11. Study casting procedure and inspection of casting defects (visual inspection)		
3DAE08: BASIC AUTOMOBILE ENGINEERING LAB	L:T:P	0:0:2
1. Study of various tools used in Auto workshop. 2. Study of conventional layout of vehicle. 3. Study and inspection of suspension system of light and heavy vehicles. 4. Study of mechanical and hydraulic braking system and bleeding of hydraulic braking system. 5. Study of Steering system of four wheeler. 6. Study of clutch (single plate & multi plate). 7. Study of sliding mesh, constant mesh and synchronous mesh gear boxes. 8. Study of Propeller shafts, Universal joints, Sliding joint, differential and rear axle. 9. Study of frame & body of vehicle.. 10. Valve refacing and valve seat grinding and checking for leakage of valves. 11. Trouble shooting in cooling system of an automotive vehicle. 12 Trouble shooting in the ignition system, setting of contact breaker points and spark plug gap. 10. Industrial visit.		

3DAE09:	THEMODYNAMICS & IC ENGINE LAB	L:T:P	0:0:2
	<p>1. Study by models/charts/actual units of the following:</p> <ul style="list-style-type: none">1.1 Cochrans boiler1.2 Lancashire boiler1.3 Babckcock & Wilcox boiler1.4 Boiler mountings1.5 Boiler accessories1.6 Lamoni boiler1.7 Benson boiler1.8 Schmiedt hartmann boiler <p>2. Study of Two-stroke and Four stroke petrol engine.</p> <p>3. Study of 4-stroke diesel engine</p> <p>4. Study of carburetors</p> <p>5. Study of MPFI system of petrol engine</p> <p>6. Dismantling and Assembly of - A. C.mechanical and electrical feed pumps of a petrol engine.</p> <p>7. Dismantling and assembly of diesel engine fuel pumps and injector.</p> <p>8. To draw the energy balance sheet of diesel engine. Find I.P. determining various efficiencies.</p> <p>9. To draw energy balance sheet of a multi cylinder petrol engine (I.P. by Morse test). Determining various Efficiencies.</p> <p>10. Study of. air compressor .</p> <p>11. Study of fuel supply system of a petrol engine (fuel pump and simple carburetor)</p> <p>12. Study of complete carburetor (Solex carburetor)</p> <p>13.Study of Petrol Injection System.</p> <p>14.Study of fuel supply system of a Diesel engine (fuel pump and fuel injector)</p> <p>15. Study of Ignition systems of an IC Engine (Battery and Magneto ignition system) and Electronic ignition system.</p> <p>16. Study of Lubrication system of an IC Engine (mist, splash and pressure lubrication)</p> <p>17. Study of cooling systems of an IC Engine (air cooling and water cooling)</p>		

3DAE10: FLUID MECHANICS & MACHINE LAB		L:T:P	0:0:2
	List of Experiments: <ol style="list-style-type: none"> 1. Study of different types of manometers and pressure gauges 2. Verification of Bernoulli's theorem 3. Determination of Cd for Venturimeter 4. Determination of Cd for Orificemeter 5. Determination of Cc,Cv and Cd of small orifice 6. Determination of coefficient of friction for pipes 7. Determination of slip, coefficient of Discharge for a reciprocating pump 8. determine discharge through V notch apparatus. 9. Study of construction and working of following : <ol style="list-style-type: none"> a. Centrifugal pump b. Pelton wheel turbine c. Francis turbine 10 Study of model of Kaplan turbine 11. Study of submersible pump, jet pump, deepwell pump. 		

SEMSTER – 4			
4DAE01 : STRENGTH OF MATERIAL		L:T:P	3:1:0
Objective: In Engineering every structure or machine element is designed for a particular application. Then it is tested. A Diploma holder should be capable of designing the various elements for particular requirements. For this he must be able to Calculate the stresses in an elements and their nature.			36
Unit –I	Stresses & Strains: Types of stress and strain, Poisson's ratio, Stress-strain relationship, Hooke's law, Elastic constants and their relations. Thermal stresses, composite bars, Concept of factor of safety & permissible stress. Compound stresses and Mohrs circle.		6
Unit –II	Bending Moment and Shear Force: Concept of a beam, and supports (Hinged, Roller and Fixed). Types of Beams: Simply supported, cantilever, fixed, overhang and continuous beams. Types of loads (distributed and point). Concept of Bending Moment & Shear Force. Sign conventions. Bending moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to uniformly distributed and concentrated loads. Relationship between load, shear force and bending moment. Point of maximum B.M. and contra flexure.		8
Unit –III	Bending and Shear Stresses: Assumptions of theory of simple bending. Derivation of the equation. $M/I = F/Y = E/R$. Concept of centroid and second moment of area, Radius of gyration, Theorems of parallel and perpendicular axes, Second Moment of area for sections: rectangle, triangle, circle, trapezium, angle, Tee, I, Channel and compound sections. Moment of resistance, section modulus and permissible bending stresses, Bending stresses in circular rectangular, I,T and L section. Comparison of strength of the above sections. Concept of shear stresses in beams,		8
Unit –IV	Torsion: Definition of torque and angle of twist. Derivation of torsion equation. Polar moment of inertia. Strength of hollow and solid shaft, advantage of a hollow shaft over a solid shaft Comparison of weights of solid and hollow shafts for same strength. Horse Power transmitted. Calculation of shaft diameter for a given Horse Power. Theory of failure. Columns & Struts: Definition of long column, short column and strut, slenderness ratio, equivalent length, critical load, collapse Load, End conditions of column. Application of Euler's and Rankine's formula (no derivation), simple numerical problems based on Euler's and Rankine's formulae		6
Unit –V	Thin Cylindrical Shells: Use of cylinders ,Stresses due to internal pressure ,Circumferential stress or hoop stress ,Longitudinal stress ,Design of thin cylinders - calculation of the various dimensions of a thin cylinder. Deflection: Concept of deflection of a beam ,Use of standard formula for calculating deflection (for point loads, U.D.L. and their combination) ,Cantilever beam ,Simply supported beam , Introduction and classification of springs ,Flat carriage springs ,Application of flat carriage springs ,Determination of number of leaves and their sections, deflection and radius of curvature ,Quarter elliptical spring Closely coiled helical springs, Application of closely coiled helical springs Determination of deflection, angle of twist, number of coils and stiffness under axial loading in ,Closely coiled helical springs.		8

Text Books:

1. **Strength of material by R.s khurmi . S. Chand publisher**
2. Strength of Materials & Theory of Structures (vol. I) B.C.Punmia
3. **Strength of Materials (Hindi) Gurcharan singh**

Reference Books:

1. Strength of Materials Ramamurtham
2. Strength of Materials Junarkar

4DAE02: Theory of Machines		L:T:P	3:1:0	36
Objective: An engineer should be well acquainted with the motion of mechanism of different machine element. With this view the study of Theory of machine is very much important. The contents of this subject include simple mechanism, kinematics of machine, dynamics of reciprocating parts, friction involved in the machine elements, power transmission, governors, balancing and vibrations in machine.				
Unit –I	Mechanisms And Machines: Definition, Kinematic pairs, types of mechanism, Special types of mechanism, Space mechanisms. Example of mechanism with higher pairs Kinematic Analysis & Synthesis: Displacement, Velocity and Acceleration of plane mechanism, Graphical and analytical techniques, Synthesis of mechanisms – Crank.			7
Unit –II	Dynamics of Reciprocating Parts:- Analytical method for velocity and acceleration of piston ,Piston effort, crank pin effort, turning moment diagrams Fluctuation of energy and speed, Energy of a flywheel, Calculating the weight of flywheel. Friction:- Friction of collars and pivots ,Friction clutches-plate clutch and centrifugal clutch ,Friction in journal bearings, Rolling friction			8
Unit III	Transmission of Power:- Flat and V-belt drives ,Velocity ratio of belt drives, slip in belt, and creep in belt. ,Length of open and cross belt drives ,Power transmitted by a belt ,Ratio of driving tension, centrifugal tension, Condition for the maximum power transmission, initial ,Tension in the belt ,Chain drives - types of chain drives roller chain and inverted tooth chain ,Gear drives - Types of gear wheels, proportions of gear tooth ,Gear trains - Simple gear train, compound gear train, reverted gear train and simple epicyclic gear train. Balancing:- Static and dynamic balancing, need of balancing ,Balancing of single rotating mass by a single mass in the same plane, by two masses rotating in different Planes ,Partial primary balancing of a single cylinder reciprocating engine			6
Unit –IV	Vibration: Vibration of single degree of freedom, Systems, Free forced Damped and undamped vibration, Frequency response and resonance, Bare excitation – Transmissibility, Governors: Types and classification, Principle of working of gravity controlled and spring controlled governors, Stability, Isochronisms, Sensitivity and capacity.			7
Unit –V	Brakes and Dynamometer:- Introduction, function, capacity of brakes Block and shoe brake ,Band brake ,Internal expanding brake ,Functions of dynamometer, Prony brake, Rope brake and Froude's hydraulic dynamometer. Gyroscope – Introduction and principle, Gyroscopic couple			8
Text Books: 1. Principal of machine By Kapoor & kumar (Hindi) 2. Theory of Machines R.S.Khurmi (S Chand Publishing) 3. Theory of Machines Abdullah Sharif 4. Theory of Machines S.S. Ratan				
Reference Book: 1 Theory of Machines Jagdishlal 2. Theory of Machines Malhotra, Gupta				

4DAE03: Electrical & Electronics Engineering		L:T:P	3:0:0	36
Objective: - This subject is designed to give basic knowledge of electrical m/c such as transformer, A.C. /D.C. machine. Diode, Transistor, digital and power electronics, relays, timers and photo electric devises.				
Unit –I	D.C. Machines:- Construction ,Operation of D.C. generator ,Operation of D.C. motor ,Types of D.C. generator and motor ,Starters ,Speed control methods Characteristics of D.C. motors ,Transformer:- Construction of single phase transformer ,Types of transformer ,Principle of operation ,E.M.F equation Testing of T/F ,Polarity test ,Open circuit test ,Short circuit test ,Efficiency and losses ,Voltage regulation ,Single phase auto transformer ,Types of 3 phase transformers ,Cooling methods			7
Unit II	Induction Motor:- Construction and working principle of single-phase induction motor ,Types of single phase induction motors (description only) ,Production of rotating magnetic field by three phase currents ,Construction and working principle of three-phase induction motor ,Torque equation ,Torque slip characteristics Starting and speed control of 3-phase induction motor ,Various types of starters Methods of increasing starting torque ,Application ,Industrial Drives:-Elementary idea for industrial drives ,Application of industrial drives in following fields - Rolling mill ,Textile mills ,Paper mill ,Crane ,Mines ,Lathe machine ,Pumps ,Food processor, refrigerators punches			7
Unit –III	Electric Heating:- Advantages of electric heating over other types of heating Principle of operation, construction and uses of electrical ,heating in ,Resistance heating ,Induction heating ,Arc heating ,Brief idea of high frequency heating, dielectric heating and its application ,Illumination:- Nature of light ,Standard terms and definitions ,Laws of illumination ,Types of lamps ,Tungston ,Halogen ,Sodium Neon, Mercury vapour lamp, Fluorescent tubes. ,Instrumentation and Measurement:- Principle, construction and working of the following measuring instruments -Ammeter and voltmeter (moving coil and moving iron type) Dynamometer types wattmeter ,Single phase AC energy meter ,Multimeter and megger ,Transducers ,Measurements of mechanical quantities like pressure, strain, temperature			8
Unit –IV	Semiconductor and P- Junction Diode:-Intrinsic and extrinsic semiconductor Description of conductor, insulator and semiconductor ,P-N junction diode Space charge and barrier potential ,Volt-ampere characteristics (forward and reverse bias) ,Zener and avalanche breakdown ,LED and LCD ,Bipolar Junction Transistor:- Fundamentals of BJT operation ,Amplification phenomenon ,CE, CB and CC configuration and DC current relationship ,Input and output characteristic of CE, CC and CB ,Digital Electronics:-Binary, Decimal, Octal and Hexadecimal number system ,Logic gates - OR, AND, NOT, NAND, NOR, Ex-OR, Ex-NOR			7
Unit -V	Power Electronics:- Introduction of SCR's, Diac, Triac, UJT ,Series and parallel connection of SCR's ,Half wave and full wave rectifiers using SCR's with resistive and inductive load ,Snubber circuit ,Application of SCR's in speed control of AC and DC motors ,Relays Contactors and Timers:-Type of relays ,Relay parts Construction and working of relays, contactors and timers. ,DC operated time delay relay ,AC operated time delay relay ,Photo Electric Devices:- Photo cells Photo transistors ,LDR's ,Solar cells – working principle and applications			7
Text Books; 1. Electronics V. K. Mehta 2. Industrial Electronics & control (Hindi) Kumar & Tyagi (Nav Bharat) 3. Electrical Engineering (Hindi & English) K.D. Sharma 4. Electrical Technology B.L.Theraja Reference Book:- 1. Basic Electronics B.L. Theraja 2. Industrial Electronics Bhattacharva				

4DAE04: C Programming		L:T:P	3:0:0	36
Objective: - 'C' is computer programming language and also structured programming language. In 'C' programming language we consider various syntax used in programming. By having good knowledge of 'C', students can write modular application and system programs. 'C' can be used in the engineering applications. By acquiring a sound knowledge of 'C' students will be able to understand the concept of all the application areas. This course is specially designed for engineering students of all diploma streams.				
Unit –I	Introduction:- Scope of 'C' Language ,Distinction and similarities with other HLLs ,Special features and Application areas ,Elements of 'C' :- Character set Key words ,Data types ,Constants and Variables ,Operators: unary, binary, ternary Operator precedence.			8
Unit –II	Console Input-Output:- Types of I-O ,Console I-O ,Unformatted console I-O: getchar(), putchar(), gets(), puts(), getch(), getche() ,Formatted I-O: scanf(), printf() Control Flow :- Statements and blocks ,if ,switch , Loops: for, while, do-while ,goto and labels ,break, continue, exit ,Nesting control statements.			7
Unit –III	Arrays :- Basic concepts ,Memory representation ,One dimensional array ,Two dimensional array.			7
Unit –IV	Functions :- Basic concepts ,Declaration and prototypes ,Calling ,Arguments Scope rules ,Recursion ,Storage classes types ,Library of functions: math, string, system			7
Unit –V	Pointers :- Basic concepts ,&, * operator ,Pointer expression: assignment, arithmetic, comparison ,Dynamic memory allocation ,Pointer v/s Arrays. Structure and Enumerated Data Types : Basic concepts, Declaration and memory map Elements of structures,Enumerated data types : typedef, enum, Union.			7
Text Book: <ol style="list-style-type: none"> 1. 'C' Programming V.Balguru Swami 2. 'C' Programming Kernighan & Ritchie 3. Let us 'C' Yashwant Kanetkar Reference Book :- <ol style="list-style-type: none"> 1. 'C' Programming Stephen Kochan 2. Programming with 'C' Schaum's Series 				

4DAE05: Mechanical Estimating & Costing		L:T:P	3:1:0	36
Objective: - The Knowledge about estimation and costing is required for engineers. This subject is designed to develop Understanding of various components of costs and making cost estimation.				
Unit –I	Introduction :- Estimating ,Definition ,Importance of estimating ,Aims and functions ,Estimating procedure ,Costing ,Definition ,Aims of costing ,Procedure of costing ,Difference between estimating and costing ,Elements of Costs :- Material cost ,Labor cost ,Expenses ,Direct expenses ,Indirect expenses ,Component of cost Overhead cost ,Allocation of on cost			7
Unit –II	Break Even Analysis and Equipment Replacement Analysis :- Break even analysis (cost, volume, profit analysts), determination of Break even point, break even point ,theory ,Equipment Replacement Analysts ,Regions ,Policy ,Guide line Various methods ,Hire Purchasing Estimation of Material Cost :- Estimation of volumes, weights and cost of materials for ,Pulley ,Spindle ,Lathe centre ,Fly wheel ,Crank shaft			7
Unit –III	Labour Costing :- Type of Wage and Incentive ,Wage Differentials ,Methods of wage Payments ,Job Evaluation Estimation in Machining :- Cutting speed, feed and depth of cut ,Setup time, operation time, machining, time tear down time, handling time ,Allowances Estimation of machining time for various lathe operations : ,Turning ,Facing Threading ,Drilling ,Chamfering ,Estimation of machining time for Milling operation ,Estimation of machining time for Shaping operation ,Estimation of machining time for Grinding operation ,Metal removal rates			8
Unit –IV	Estimation in Welding Shop :- Estimation of electric are welding cost Estimation of gas welding ,Estimation of gas cutting ,Factors affecting welding cost Estimation in Forging Shop :- Hand forging ,Machine forging ,Estimation of losses in forging operation , net weight, Time ,Estimation of cost of forging operation			7
Unit –V	Estimation in Pattern Making and Foundry Shop :- Pattern allowances Estimation of pattern cost ,Estimation of foundry shop , Estimation in Sheet Metal Shop :- Sheet metal operations ,Sheet metal joints ,Estimation of time and cost in sheet metal operations ,Blank layout ,Capacity for power press.			7
Text Book :- <ol style="list-style-type: none"> 1. Estimating & Costing Banga & Sharma 2. Mechanical Estimating & Costing O.P. Khanna Reference Book :- <ol style="list-style-type: none"> 1. Mechanical Estimating & Costing T.T.T.I.Madras 				

4DAE06: STRENGTH OF MATERIAL LAB	L:T:P	0:0:2
<ol style="list-style-type: none"> 1. Study of different properties of material. 2. Study and operation of UTM 3. Tensile test on mild steel specimen and plotting stress strain curve. 4. Bending test on beams. 5. Compression test on common structural materials viz. timber, cast iron etc. 6. Determination of toughness of cast iron and mild steel specimen by Charpy and Izod test. 7. Hardness test by Brinell and Rockwell test. 8. Determination of deflection for various types of loading 9. Torsion test on brass and mild steel. 10. Determination of stiffness of close coiled spring 11. To study fatigue testing machine. 		

	<p>1. Machining Symbols and Tolerances :</p> <p>1.1 Introduction of limits, fits, tolerances.</p> <p>1.2 Machining symbol</p> <p>a. Application of machining symbol</p> <p>b. Indication of machining allowance</p> <p>c. Indication of surface roughness</p> <p>1.3 Tolerancing</p> <p>a. Unilateral and Bilateral tolerance</p> <p>b. Standard tolerance</p> <p>c. Symbols for tolerance, deviation and fits</p> <p>2. Working Drawing :</p> <p>a. Piston and Connecting rod</p> <p>b. Crankshaft</p> <p>c. Bush bearing, ball bearing and roller bearing</p> <p>d. Lathe spindle</p> <p>3. Assembly Drawing:</p> <p>a. Drilling jigs, milling jigs</p> <p>b. Stepped pulley, fast and loose pulley, V – belt pulley,</p> <p>c. Footstep bearing, Plummer block and Universal coupling</p> <p>d. Lathe tail stock and Shaper tool head</p> <p>e. Fuel injector and Fuel injection pump (jerk type)</p> <p>f. Machine vice and screw jack</p> <p>4. Gear tooth profile</p> <p>4.1. Gear types and gear nomenclature (spur, helical and bevel gears)</p> <p>4.2 Drawing involute tooth profile (spur gear only) by-</p> <p>a. Approximate method</p> <p>b. Prof. Unwin's method</p> <p>5. Cam profile</p> <p>5.1 Types of cams and followers</p> <p>5.2 Types of follower motions</p> <p>5.3 Construction of disc cam profile with knife edge follower</p> <p>6. Computer Graphics :</p> <p>6.1 Application software :- Introduction of CAD and similar software application like CATIA , Pro / Engineer and other</p> <p>6.2 Getting Started – I</p> <p>Starting AutoCAD – AutoCAD screen components – Starting a drawing: Open drawings, Create drawings (Start from scratch, Use a template & Use a wizard) – Invoking commands in AutoCAD – Drawing lines in AutoCAD – Co-ordinate systems: Absolute co-ordinate system, Relative co-ordinate system – Direct distance method – Saving a drawing: Save & Save As – Closing a drawing – Quitting AutoCAD</p> <p>6.3 Getting Started – II</p> <p>Opening an existing file – Concept of Object – Object selection methods: Pick by box, Window selection, Crossing Selection, All, Fence, Last, Previous, Add, Remove – Erasing objects: OOPS command, UNDO / REDO commands – ZOOM command – PAN command, Panning in real time – Setting units – Object snap, running object snap mode – Drawing circles</p> <p>6.4 Draw Commands</p> <p>ARC command – RECTANG command – ELLIPSE command, elliptical arc – POLYGON command (regular polygon) – PLINE command – DONUT command – POINT command – Construction Line: XLINE command, RAY command – MULTILINE command</p> <p>6.5 Editing Commands 6</p> <p>MOVE command – COPY command – OFFSET command – ROTATE command – SCALE command – STRETCH command – LENGTHEN command – TRIM command – EXTEND command – BREAK command – CHAMFER command – FILLET command – ARRAY command</p>	
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	<p>– MIRROR command – MEASURE command – DIVIDE command – EXPLODE command – MATCHPROP command – Editing with grips: PEDIT</p> <p>6.6 Drawing Aids Layers – Layer Properties Manager dialog box – Object Properties: Object property toolbar, Properties Window – LTSCALE Factor – Auto Tracking – REDRAW command, REGEN command</p> <p>6.7 Creating Text Creating single line text – Drawing special characters – Creating multiline text – Editing text – Text style</p> <p>6.8 Basic Dimensioning Fundamental dimensioning terms: Dimension lines, dimension text, arrowheads, extension lines, leaders, centre marks and centrelines, alternate units – Associative dimensions – Dimensioning methods – Drawing leader</p> <p>6.9 Inquiry Commands AREA – DIST – ID – LIST – DBLIST – STATUS – DWGPROPS</p> <p>6.10 Editing Dimensions Editing dimensions by stretching – Editing dimensions by trimming & extending – Editing dimensions: DIMEDIT command – Editing dimension text: DIMTEDIT command – Updating dimensions – Editing dimensions using the properties window – Creating and restoring Dimension styles: DIMSTYLE</p> <p>6.11 Hatching BHATCH, HATCH commands – Boundary Hatch Options: Quick tab, Advance tab – Hatching around Text, Traces, Attributes, Shapes and Solids – Editing Hatch Boundary – BOUNDARY command</p> <p>6.12 Blocks The concept of Blocks – Converting objects into a Block: BLOCK, _BLOCK commands – Nesting of Blocks – Inserting Blocks: INSERT, MININSERT commands – Creating drawing files: WBLOCK command</p> <p>– Defining Block Attributes – Inserting Blocks with Attributes – Editing Attributes</p> <p>6.13 Plotting Drawings in AutoCAD PLOT command – Plot Configuration – Pen Assignments – Paper Size & Orientation Area – Plot Rotation & Origin – Plotting Area – Scale</p> <p>6.14 Draw isometric views of simple objects.</p> <p>6.15 Introduction of 3D modeling, Wire frame and surface modeling.</p> <p>Text Book :- 1. AutoCAD for Windows Bible (with Applications) / Sham Tickoo / Galgotia Publications Pvt. Ltd. 2. Auto CAD George omura 3. Machine drawing P. S. Gill</p> <p>Reference Book :- 1. Advanced AutoCAD Robert M. Thomas / Sybex BPD 2. AutoCAD Part – 1 & 2 Banglay Prokashito Tutorial / CD Media / Sonolite, 55, Elliot Road, Kolkata 3. Machine Drawing N.D. Bhatt</p>	
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List of Experiments

1. Study of D.C. machines.
2. Study of D.C. starter
3. Connecting starting and reversing the direction of D.C. motor
4. Determination of turn ratio of transformer
5. Open circuit and short circuit test on a single phase transformer
6. Connecting, starting and reversing the direction of 1-phase induction motor
7. Starting of 3 phase Induction motor by D.O.L. starter / star- delta starter motor.
8. Study of various types of transducers.
9. Use of megger and multimeter.
10. To plot V-I characteristics of P-N diode.
11. To plot V-I characteristics of Zener diode.
12. To plot V-I characteristics of NPN transistor in CE, CB, CC configuration.
13. To plot V-I characteristics of PNP transistor as above
14. Study of logic gates of- AND, OR, NOT , NAND, NOR, Ex-OR, Ex-NOR
15. Study and testing of solar cell and photo cell

4DAE09:C PROGRAMMING LAB	L:T:P	0:0:2	
	1. Problems based on arithmetic expression, fixed mode arithmetic. 2. Problems based on conditional statements and control structures. 3. Problems based on arrays (1-D, 2-D), functions and pointers. 4. Problems based on engineering applications		
4DAE10: TECHNICAL SEMINAR	L:T:P	0:0:2	

SEMESTER 5			
5DAE01: Auto Thermodynamics		L:T:P	3:1:0
Objective: - This subject imparts the knowledge of engine fuels combustion phenomenon of various types of combustion chambers. Different modes of heat transfer and the knowledge of heat control through refrigeration and air conditioning is also included in this subject.			38
Unit –I	Combustion in S.I. & C.I. Engine : General idea of combustion theory, Normal combustion stages, Effect of engine variables on ignition lag and flame propagation, Abnormal combustion, Theories of detonation, Effect of engine variables on detonation, Stages of combustion, Delay period or ignition lag, Variables effecting delay period, Diesel knock, Methods of controlling diesel knock. S.I. & C.I. Engine Combustion Chambers: Basic requirements of a good combustion chamber, Comparison of various types of combustion chambers with line sketches by show in the position of valves and spark plugs, C.I. engine combustion chambers, Induction swirl and open combustion chambers.		10
Unit –II	I.C. Engine Fuel: Petroleum and non-petroleum base liquid fuels, Gaseous fuels, Heating value of fuels, Rating of S.I. fuels, Flash point and fire point. Air Pollution by Exhaust Gases: Gases exhausted by automobile vehicles, Smoke and soot formation, Control of pollutant, catalytic converter, Diesel odor and control, Measurement of pollution -Smoke meter and exhaust gas analyzer.		6
Unit –III	Refrigeration and Refrigerants: Introduction, principles and applications, units and rating of machines, Classification and properties of refrigerants, Nomenclature of refrigerants Refrigeration System : Air refrigeration system - Reversed Carnot cycle, theoretical and actual, Vapour Compression Cycle, Simple vapour absorption system and comparison with vapour compression system		6
Unit –IV	Psychrometry: Psychrometric properties, psychometric relations, pyschrormetric charts, Psychrometric processes, Mixing of air streams, Human comfort, metabolism in human body, comfort chart and effective temperature. Automobile Air Conditioning: Various transport air conditioning applications, Summer and winter design conditions, Operations of automobile air conditioning, Components and controls, Air distribution system, Trouble chart for Auto-air conditioning.		8
Unit –V	Heat Transfer: Importance of Heat Transfer, Modes of Heat transfer, Conduction, Convection, Radiation. Conduction : Fourier’s law, Overall Heat transfer coefficient, Critical insulation, Heat transfer through fins Convection : Natural convection, Forced convection, Heat exchangers Radiation : Absorption, Reflection and transmission, Radiant energy distribution curve Emissive power, Black body & white body, Grey body, Kirchoff ’s law		8
Text Books: 1. Refrigeration and Air Conditioning By N.K Mangal (Hindi) 2. Internal Combustion Engines ML.Mathur & R.P.Sharma 3. Automobile Engines Dr. Kirpal Singh 4. Refrigeration & Air Conditioning C.P.Arora 5. Refrigeration & Air Conditioning R.S. Khurmi 6. Thermal Engineering Rai & Sonrao (Satya Prakashan) 7. Heat Transfer Arora & Domkundwar			
Reference Book:. 1. Refrigeration & Air Conditioning Manohar Singh 2. Refrigeration & Air Conditioning R.K. Rajput			

SDAE02: Process in Manufacturing		L:T:P	3:0:0	36
Objective:- Manufacturing processes are developing very fast with rapid changes in technology. This subject will provide insight to the students regarding metal forming methods, newer machining processes, jigs and fixtures. These processes are needed for modern and mass production processes. In order to create interest in the subject theory should be supplemented by visit to industries where new manufacturing processes are being used.				
Unit I	<p>Metal Forming Process :- Metal Forming Processes ,Forging ,Hammer forging, drop-forging, dies for drop-forging, drop hammers, press forging, forging machines or up setters, forging tools, forging defects and remedies. Concept of losses in forging operation, estimation of stock required for hand forging considering scale and shear losses</p> <p>Rolling: Elementary theory of rolling, hot and cold rolling, types of rolling mills, rolling defects and remedies. , Press Forming: Types of presses, working, and selection of press dies die-material. Press operation-Shearing, piercing trimming, shaving, notching gearing or rubber forming, embossing, stamping, punching. Drawing, extrusion, pipe and tube drawing, Energy forming technique - Explosive forming, electromagnetic forming.</p>			7
Unit II	<p>Conventional Metal Cutting Processes :- Metal Cutting ,Elementary theory of metal cutting, chip formation, continuous chip, continuous chips with ,B.U.E., discontinuous chips ,Mechanism of chips formation, geometry of chip formation, forces on chip. Merchant's diagram ,Tool life, Economics of tool life ,Machinability Factors affecting Machinability ,</p> <p>Broaching Machine : ,Classification and description of broaching machines Elements of broach ,Types of boraches</p> <p>Gear manufacturing processes :Gears hobbing ,Gear shaping ,Gear Finishing methods :Gear shaving, gear burnishing</p> <p>External threading processes :Die heads, thread milling ,Thread grinding, thread rolling</p>			8
Unit III	<p>Newer Machining Processes :- Mechanical Processes ,Ultrasonic Machining (USM) : Introduction, fundamental principles, process, advantages and ,Limitation, application ,Abrasive jet machining (AJM) - Introduction, principles, process, advantages and Limitation, application ,Electro Chemical Processes ,Electro chemical machining (ECM) - Fundamental principles, process, applications Electro chemical grinding (ECG) - Fundamental principles, process, applications Electrical Discharge Machining (EDM) ,Introduction, mechanism of metal removal basic EDM circuit ,Principle of operation, material removing rate, dielectric fluid and applications of EDM ,Laser beam machining (LBM) - Introduction, machining process and applications ,Electro beam machining (EBM) - Introduction, principle processes and applications ,Plasma arc machining (PAM) and Welding - Introduction, principle processes and applications.</p>			7
Unit IV	<p>Metallic Coating Processes:- Metal spraying, galvanising, Electroplating and anodising.</p> <p>Plastic Process :- Working principle, Advantages and limitation of following process : ,Injection moulding ,Blow moulding ,Compressive moulding</p>			7
Unit V	<p>Jigs and Fixtures :- Importance and use of jigs and fixtures ,Principle of location Locating devices, Clamping devices, Types of jigs-Drilling jigs, bushes (fixed, liker, slip). Types of drilling jig - Template jigs, plate jig, channel jig, leaf jig. ,Fixture for milling, Advantages of jigs and fixtures</p>			7
<p>Text Books :-</p> <ol style="list-style-type: none"> 1. Production Engineering R.K. Jain 2. Manufacturing Science Amitabha Ghosh & A.K. Mallik 3. Production Technology Pandey.Singh <p>Reference Books :-</p> <ol style="list-style-type: none"> 1. Production Engineering P.C. Sharma (S. Chand) 2. Manufacturing Process – II Bhatnagar, Sharma (Nav Bhart) 				

5DAE03 Workshop Technology & Metrology II		L:T:P	3:0:0	36
Unit –I	Shaping, Planning and Slotting Machines:- Specification, constructional features working and uses of various types of shapers, planers and slotters ,Mechanism used in shaper - crank and slotted link, whitworth quick return and hydraulic mechanism, Feed ,mechanism ,Mechanism of planner ,Various works holding devices and clamping devices used on shaper and planner ,Various shaper and planner operations Shaper and planner tools ,Cutting speed, feed and depth of cut on shaper ,Difference between shaper, planner and slotter			8
Unit –II	Cutting Fluids and Cooling Process:- Types of cutting fluids and coolants Functions of cutting fluid and its action ,Difference between cutting fluid and coolant Selection of cutting fluids for different material and operations.			7
Unit –III	Gear and Screw Measurement:- Screw thread terminology, errors in threads Effective diameter measurement by two wire and three wire methods ,Major and minor diameter measurement, Thread micrometers ,Gear tooth terminology ,Gear tooth vernier calliper and its application, Measurement of gear pitch.			7
Unit –IV	Limits, Fits and Tolerance:- Interchangeability - control and need ,Definitions and Terminology of limits, fits and tolerances ,Basis of limit system ,Type of fits ,Limit gauges			7
Unit –V	Machine Tool Metrology:- Alignment tests ,Performance tests ,Alignment test on lathe and drilling machine			7
Text Book : 1. Workshop Technology (Hindi) - II Tahl Manghnani 2. Workshop Technology (Hindi) - II B.S.Raghuvanshi 3. Workshop Technology - II Hazra & Chaudhary. 4. Workshop Technology (Hindi) S.K.Bhatnagar 5. Production Technology R.K. Jain Reference Book :- 1. Production Technology by PC Sharma 2. Engineering Metrology R.K.Rajput				

5DAE04 Advanced Workshop Techniques		L:T:P	3:0:0	36
Unit –I	Metal Cutting Saws: - Specifications, description, working and uses of sawing machine, Description, specification of cutters/ blade for sawing machines, blade setting. Boring :- Principle of boring ,Classification of boring machines and their description Specification of boring machine ,Boring tools ,Boring bars and boring heads Description of Jig boring machine			8
Unit –II	Milling Machines: Types of milling machines, constructional features of horizontal milling M/C. general maintenance of the machine, types of milling cutters, milling operations like plane milling, space milling, angular milling form milling, straddle milling, gang milling, Negative rack milling, cutting speed and speed for different tools in up and down milling. Simple compound and Differential indexing, milling of spur gears and racks. General and periodic maintenance of milling machine.			7
Unit –III	Grinding and Grinding Machines :- Purpose of grinding ,Various elements of grinding wheel Abrasive, Grade, Structure, Bond ,Common wheel shapes and types of wheels - built up wheels, mounted wheels and diamond wheels. ,Specifications of grinding wheels as per BIS ,Truing and dressing, balancing and mounting of wheel ,Grinding methods: surface grinding, cylindrical grinding and centreless grinding ,Grinding Machines- cylindrical grinders, surface grinders, internal grinders, centreless grinders and tools ,and cutter grinders. ,Selection of grinding wheel Capstan and Turret Lathes :- Concept of ram or capstan type and turret or saddle type machine Principal parts of capstan and turret lathes ,Capstan and Turret lathe mechanism : Turret indexing mechanism, Bar feeding mechanism ,Work holding devices : Jaw and collet chucks ,Tool holding devices : slide tool holder, knee tool holder, knurling tool holder, recessing tool holder, form tool holder, Tap and Die holder, V-steady box tool holder, roller steady box tool holder ,Introduction to turret tooling layout ,Difference among capstan, turret and conventional lathe.			7
Unit –IV	Automatic Machines :- Brief description of single spindle and multi-spindle automatic machines viz. Swiss type automatic screw ,machine and Turret type screw machines ,Transfer Machines- Inline , Rotary Indexing Table , Drum Machines Metal Finishing Processes :- Purpose of finishing surfaces ,Description of lapping, super finishing, polishing and buffing processes ,Description of honing machine and honing tools			7
Unit –V	Maintenance of Machine Tools :- Importance of maintenance ,Different type of maintenance ,Sequence of maintenance operation : Disassembly, washing, fault finding, assembly Installation and Testing of Machine Tools :- Different types of machine foundation ,Foundation plan ,Machine tool testing			7
	Text Book 1. Workshop Technology II Hazra Chaudhary 2. Workshop Technology II Raghuvanshi 3. Workshop Technology (Hindi) Tahir Maghnani Reference Book :- 4. Production Technology R.K.Jain & S.C. Gupta 5. Production Technology Pandey & Singh			

5DAE05: Industrial Engineering		L:T:P	3:1:0	36
Unit –I	<p>Production, Planning and Control :- Definition and importance, types of production -job, batch and mass forecasting, routing, scheduling, Dispatching and follow up ,Break even analysis and Gantt chart ,Project scheduling, application of CPM and PERT techniques ,Analysis and control of project cost in CPM and PERT, simple numerical problems.</p> <p>Inventory Control: - Definition, types of inventory - Codification and standardization, ABC analysis. Economic ordering quantity, Procurement cost, carrying charges, lead-time, re-order point.</p> <p>Depreciation : Definition, Causes of depreciation, Different method of calculating depreciation</p>	8		
Unit –II	<p>Inspection and Quality Control :- Inspection and its objectives, Types of inspection, Remedial, preventive and operative stage of inspection, Inspection of incoming material Inspection of work in process, Inspection of finished goods, Objectives and advantages of quality control, Functions of quality control department.</p> <p>Plant Location and Layout : Factors affecting plant location, Factor effecting plant layout, Types of plant layout</p> <p>Work Study : Definition, Production and productivity,</p> <p>Method study: Definition, Objectives, Methods study procedure, Principles of motion economy,</p> <p>Work measurement : Definition, Principle, Calculating of standard time</p>	8		
Unit –III	<p>Structure of a Fleet Organisation : Route planning, Vehicle and crew scheduling, Road Accident</p> <p>Motor Vehicle Laws : Motor vehicle act and rules, Control of transport vehicle, Traffic rules and regulation</p>	5		
Unit –IV	<p>Principles of Management : (Elementary Idea) Management, administration and organisation, difference between them. Scientific management : Meaning, characteristics, objectives and advantages, Taylor's scientific management, Fayol's principles of management, functions of management, Types of ownership, sole trading, partnership, joint stock, co-operative and public enterprise, Types of organisation, different types and their charts. Importance of human relation professional ethics, Need for leadership, leadership qualities, Introduction, objectives and functions of Human Resource Development, Finance, Marketing and Material management (Purchase, Store, sales)</p> <p>Wages and Incentives : Definition and requirements of a good wage system methods of wage payment Wage incentives - type of incentive, difference in wage incentive and bonus. incentive to supervisor.</p>	8		
Unit V	<p>Entrepreneurship : Entrepreneurship and Entrepreneur, Essential Characteristics of a good Entrepreneur, Industrial Policy, Classification of industries- Tiny, small scale, Medium scale, Large scale, Handicraft, Ancillary, Type of industries- Production, Job based & Service</p> <p>ISO : 9000 Series of Quality System : Definition of few important terms related to ISO quality system Various models for quality assurance in ISO : 9000 series Various elements of ISO : 9001 model (20 points) Benefits by becoming an ISO : 9000 company Introduction to total quality management (TQM)</p>	7		
<p>Text Book :</p> <ol style="list-style-type: none"> 1. Primary Industrial Engineering (Hindi) by suresh Dalela. 2. Industrial Engineering (Hindi) V.K.Sharma 3. Entrepreneurial Development S.S. Khanka 4. Statistical Quality Control Mahohar Mahajan 5. ISO : 9000 Quality System S. Dalela <p>Reference Book:</p> <ol style="list-style-type: none"> 1. Industrial Engineering (Hindi) By suresh dadela 				

5DAE06: AUTO THERMODYNAMICS LAB	L:T:P	0:0:2
	<ol style="list-style-type: none"> 1. Study of different type of S. I. combustion chambers. 2. Study of different type of C. I. combustion chambers 3. Emission measurement by smoke meter and exhaust gas analyzer. 4. To aquatint with the use of refrigeration tools, charging board, special refrigeration tube fittings. 5. Copper tube jointing practice, flaring and brazing. 6. Study of following components:- <ol style="list-style-type: none"> 6.1 Auto air-conditioning Compressor 6.2 Expansion valves 6.3 Starting and over load relay 6.4 Thermostats 6.5 Strainer and receiver drier 6.6 Magnetic clutch 7. Charging practice including making vacuum, pressure testing, charging and final testing for performance 8. Determination of psychometric properties of air at different places with the help of sling- psychrometer and hygrometer. 9. Using refrigeration trainer test rig / Air-conditioning test rig to find out its refrigerating capacity, power input and C.O.P. 10. Study of different type of heat exchangers. 	

5DAE07: PROCESSES IN MANUFACTURING LAB		L:T:P	0:0:2
PRACTICALS 1. Exercise on forging operation by power hammers 2. Study of USM. 3. Exercise on buffing. 4. Exercise on lapping. 5. Exercise on super finishing. 6. Exercises on Electro plating. 7. Demonstration of Engine cylinder honing with the help of honing machine through industrial visit. 8. Design and manufacture of one drilling jig. 9. Design and manufacture of one milling fixture. 10. Demonstration of newer machining processes / metal cutting process/ plastic process through industrial visits.			

5DAE08: Workshop Technology & Metrology LAB II		L:T:P 0:0:3	
	<ol style="list-style-type: none"> 1. Preparing a M.S. block with all faces finished and V grooved on shaper machine 2. Planning practice on a planner on a rectangular C.I plate. 3. Internal slot cutting on the slotter machine 4. Measurement of thread characteristics 5. Study and use of slip gauges and limit gauges. 6. Internal and external taper measurement. 7. Measurement of gear characteristics 8. Measurement of angle with sine bar and slip gauges 9. Study and use of comparators and tool room microscopes. 10. Measurement of bore with cylinder dial gauge for ovality and taper. 11. Measurement of worn out I.C. Engine piston, clearance between cylinder and piston and between bearing and journal 		

5DAE09: ADVANCE WORKSHOP TECHNIQUES LAB		L:T:P 0:0:3	
	<ol style="list-style-type: none"> 1. Face milling. 2. Gear cutting on a milling machine. (Spur and Bevel) 3. Key way cutting on shaft 4. Exercise on gang milling 5. Job on Capstan lathe and Turret lathe. 6. Job on grinding machine. <ol style="list-style-type: none"> 6.1 Surface grinding 6.2 Cylindrical grinding (internal and external) 6.3 Centre less grinding (internal and external) 7. Milling cutter grinding on tool and cutter grinder 8. Job using copying attachment on lathe 9. Exercises on honing and lapping machine 10. Super finishing practice on lathe 11. Maintenance of milling, Grinding and Lathe machines 		
5DAE10:	INDUSTRIAL TRAINING		

	SEMESTER 6	
6DAE01	AUTO ELECTRICAL EQUIPMENTS L:T:P 3:1:0	38
Unit –I	Introduction : Various electrical system and functions, Insulated and earth return system, negative and positive earthing, 6v, 12v, 24v electrical system. Function and types of battery, Lead acid battery- principle, chemical reaction and Construction detail, Battery rating, Battery Charging, Battery test, Battery failure and rectification, Battery maintenance and storage (dry and wet type), Alkaline type battery	8
Unit –II	Alternators : Construction and working principle, Advantage over dynamo, Rectification Output control, One unit voltage regulator, Two unit voltage regulator, Regulator with transistor and vibrating contact point, Fully transistorised regulator. Starting Motor : Motor type, and specifications, Construction of motor and working principle, Starter motor drive mechanism, Starter motor control.	8
Unit –III	Ignition System: Principle, Spark formation, production of high voltage, Factor affecting spark – energy. Coil ignition system : Working principle, Constructional detail of induction coil and distributor, Ignition timing, Ignition advancing mechanism, Magneto ignition system Comparison of coil and magneto ignition system. Spark Plug : Constructional details and classification, Effect of leaded fuels Radio interference, Plug polarity	8
Unit –IV	Lighting System : Lighting circuits, Head lamps, Pre focused bulb type, Sealed beam type, Double filament type, Focusing and alignment of head lamp, Fog lamp, back-up light, brake warning light, side light, direction indicator, hazard warning light (functions only) Switches and Wiring : Switches (function only)-Tumbler door switch, Head light, Parking light, Combination switch, Horn switch Wiring, Horn : Electrical horn- Diaphragm type, Wind tone type, Air pressure horn	8
Unit –V	Recent Electrical Equipment in Automobiles : Electronic magneto ignition system, Electronic fuel injection, E.C.M., Sensors and their supporting circuits, Indicating devices and circuit, Fuel gauge, Engine temperature indicator, Oil pressure indicator, Electrical fuel pump control system, Central Door locks, Heater and defroster, Electrical control circuits of air conditioner for a car. Mechatronics : Open loop and close loop control system. Valves, drives and actuators. Basic pneumatics circuits, Sensors, Transducers and signal conditioners	6
	Text Book : 1. Automotive Electrical Equipment William H Crouse 2. Basic Automobile Engineering C.P.Nakra 3. Automobile Engineering Kirpal Singh Reference Book : 1. Automobile Engineering R.B. Gupta 2. Automotive Electrical Equipment P.L. Kohali	

6DAE02: CNC Machines & Automation		L:T:P 3:0:0	36
Unit –I	Introduction :- NC machines ,CNC machines ,DNC machines ,Advantages of NC machines over conventional machines ,Difference between NC machines and SPM Advantage and disadvantages of CNC machines over NC machines ,Application of CNC machines		8
Unit –II	Component of NC Machines :- Basic components of NC system ,Input mediums- punched cards, magnetic tapes, floppy disks and papers tape ,NC coding ,Machine control unit (MCU) ,Sub units of MCU ,Machines tool ,Numerical control procedure ,Classification of Numerical Control Machines ,Classification based on feedback control system, Feedback devices – Velocity feedback devices and position feedback devices. ,Classification based on motion control system ,Interpolators Classification based on circuit technology ,NC coordinate system		7
Unit –III	Constructional Details of CNC Machines :- Introduction ,Machine structure ,Slide ways ,Spindle ,Drive System ,Motion transmission ,Location of transducers ,Swarf removal ,Safety and guarding Tooling for CNC Machines :- Introduction ,Cutting tools for CNC machines ,Pre set tools ,Index able inserts ,Qualified tools ,Cutting tools material for CNC machines ,Automatic tool changer (ATC) ,Work holding devices		6
Unit –IV	Fundamentals of Part Programming :- NC Words ,Programming formats ,Part programming for machining- point-to-point , straight line and along curved surface Part programming for lathe, milling and drilling operations Advanced Part Programming :- Standardized fixed cycles ,Non- Standardized fixed cycles ,Do-loops ,Subroutines Computer Aided Part Programming :- Geometry statements ,Motion statements Post processor statements ,Auxiliary statements		8
Unit –V	Robotics :- Introduction ,Advantages of a robot ,Robot terminology ,Major Features of a robot ,Manipulator ,Controller ,Sensors ,Power supply unit ,Types of Robots According to the structure of Manipulator ,According to type of system,According to type of control loops ,Application of robots. Automation in Manufacturing :- Introduction to machining centre ,Introduction to computer Integrated manufacturing (CIM) ,Introduction to flexible manufacturing system (FMS) ,Introduction to group technology (GT) ,Introduction to computer process planning (CAPP)		7
Text Book :- 1. CNC Machine- Programming & Application Adithan & Pabla New Age International 2. CNC Machine Dhanpat Rai & Sons 3. CAM S. Vishal (S. K. Kataria & Sons) Reference Book:- 1. CAD/CAM Groover (TMH) 2. Computer Aided Manufacturing Rao, Kundra, Tiari (TMH)			

6DAE03: Vehicle Technology		L:T:P	3:0:0	38
Unit -1	Chassis Layout : Different chassis layouts for light vehicles, Layouts for commercial vehicles Suspension System: Forces acting on suspension system, Springs, Types, materials, constructional details. Independent Suspension System (Front and Rear), Air Suspension System - Layouts and Working, Advantages. Gas filled shock absorber - Operation.			6
Unit-2	Braking System : Power Brakes - Layout, constructional details and working of following, Air Brakes, Air Hydraulic Brakes, Vacuum Brakes, Disc Brakes, Introduction to Anti Lock Braking System, Electronic Brakeforce Distribution, Electronic, Stability Control, Introduction to Engine exhaust brakes used in automobiles. Wheels and Tyres : Construction of Cross ply. Radial ply and Belted biased ply tyres. Comparison of cross ply and radial ply characteristics. Tubeless Tyres – Advantages and Disadvantages Consideration in Trade design. Static and Dynamic balancing of wheels. Wheels and tyre troubles, their causes and remedies, care and maintenance of tyre, tubes and valves. Tyre Rotation, Factor affecting tyre life. Retreading of tyres.			8
Unit-3	Clutch : Factors affecting the power transmitted by clutch. Construction and operation of a Diaphragm spring type clutch, Comparison of coil spring and diaphragm spring type clutches, Clutch Operation - Mechanical - Rod and Cable. Hydraulic operation - Clutch master cylinder and slave cylinder. Electromagnetic operation, Vacuum operation, Fluid Flywheel - Construction, characteristics, Advantages and disadvantages. Transmission : Transmission requirements, tractive effort. Vehicle Resistances - Rolling, Air and Gradient resistance and their effect on vehicle motion. Power and Torque, Power weight ratio, Draw bar pull. Transfer case- Construction and Operation. Transaxle Unit - Types construction and operation. Principle and operation of Overdrive Torque converter, Automatic transmission, Free wheeling device.			8
Unit-4	Final Drive : Hotchkiss and Torque tube drive. Torque reaction, Divided propeller shaft with intermediate support bearings. Differential - Types construction and working. Limited slip differential. Double reduction differential, Worm, Bevel and Hypoid type final drives. Steering Systems : Steering Mechanisms: Davis and Ackerman steering system. Fundamental equation for correct steering. Cornering force end slip angle, under steer and over steer. Steering Linkages - Types - Centre Arm, Parallelogram and Long arm short arm types. Front End Geometry: - Camber, Caster, Kingpin or Steering axis inclination. Included angle, Toe in and Toe out on turns. Definition and their effects. Power steering :Types – Integral, linkages types, Electronic power steering. Construction and working of power steering.			8
Unit-5	Upholstery : Seats - location, mounting and adjustment, Seat belts - location fitting points and operation, Ceiling, side panels, door channels, beading and furnishing materials Engine components : Types, functions, constructional details, materials and defects in following engine components- Cylinder, cylinder liner, block and head Piston, piston rings, gudgeon pin connecting rod, lubrication of big end and small end Crank shaft, Flywheel, Ring gear, Vibration damper Cam shaft, cam driving mechanisms Valves, valve operating mechanisms, Tappet clearance and its adjustment Gaskets and oil seals, Bearings Requirements of bearing, Main bearing, Big end bearing, Bearing failures and causes			8
Text Book :- Vehicle and Engine Technology (Vol. 1 & 2) Heinz Heisler.				

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| <ol style="list-style-type: none">2. Basic Automobile Engineering C.P. Nakra.3. Automobile Engineering R.B. Gupta4. Automobile Engineering Kripal Singh.5. Auto Chassis and Body P.L. Kohli <p>Reference Book:-</p> <ol style="list-style-type: none">1. Auto Chassis and Body Crouse, Anglin2. Automobile Engineering G.B.S.Narang | |
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6DAE04 : Component Design & Estimation		L:T:P 3:1:0	36
Unit-1	Introduction : General consideration in machine design, General procedure in machine design Selection of material, Working stress and factor of safety, selection of factor of safety Stress concentration, stress concentration factor and methods of reducing stress concentration, Fatigue and endurance limit, Effect of load, surface finish and size on endurance limit, Preferred number Design of Welding Joints : Types of welded joint and Design of lap joint and butt joint Strength of transverse and parallel fillet welded joints in axial loading Basic welding symbols	7	
Unit-2	Design of Screw and Bolts : Initial stresses due to screwing up, Stress due to external forces Stress due to combined forces, Bolt of uniform strength, Screw thread, designations and its dimensions. Design of joints & components : Design of simple cotter joints Design of knuckle joints Design of turnbuckle Design of hand lever Design of foot lever	8	
Unit-3	Design of Keys and Couplings: Design of sunk key Design of rigid flange coupling Design of Shaft : Shaft subjected to twisting moment Shaft subjected to bending moment Shaft subjected to combined twisting and bending moment	7	
Unit-4	Bearings (no numerical problems) : Introduction and Classification Material used for bearings and their properties Types and uses of rolling contact bearings Standard dimension and designations of ball bearings Selection of rolling elements bearings. Break Even Analysis : Break even analysis (cost, volume, profit analysis), determination of Break even point, break even point theory	7	
Unit-5	Estimating : Definition, Importance of estimating, Aims and functions, Estimating procedure Costing : Definition, Aims of costing, Procedure of costing Elements of Costs : Material cost, Labour cost, Expenses, Direct expenses, Indirect expenses, Component of cost, Overhead cost, Allocation of on cost	7	
Text Book:- 1. Machine Design Pandya & shah 2. Machine Design R.S.Khurmi 3. Machine Design Sharma & Aggrawal Reference Book:- 1. Machine Design V. B. Bhandari 2. Engineering Design J. E. Shieglay (McGraw-Hill)			

6DAE05 Power Generation		L:T:P	3:1:0	36
Unit –I	<p>Introduction :- Different types of conventional sources of energy ,Base load and peak load plants ,Scope of conventional energy sources in India ,Status of conventional power plants in India</p> <p>Thermal Power Plants :- General layout and working ,Factors of site selection Methods of coal handling ,Unloading devices ,Ash handling system ,Concept of super thermal power plants ,Combustion equipment ,Basic requirements</p> <p>Methods of coal burning :- Hand firing, Stoker fired systems, Pulverised fuel fired system</p> <p>Coal Burners :- Stream line, Turbulent types ,Combustion control, fluidised bed combustion</p>			7
Unit –II	<p>Hydro-Electric Power Plant :- Advantages and application of hydroelectric power plants ,Elements of hydroelectric power plant ,Plant layout of low head and high head intake ,Combination of Hydel Thermal power plants ,Hydro electric power plants in India.</p> <p>Nuclear Power Plant :- Introduction to nuclear reactions and nuclear fuels ,Site selection of nuclear power plants</p> <p>Nuclear reactors: - various elements of nuclear reactors, Comparison of nuclear power plant with thermal and hydel power plants ,Common types of nuclear reactors ,Pressurized water reactor ,Boiling water reactor ,Gas cooled reactors</p> <p>Liquid metal cooled reactor ,Fast breeder reactor ,Nuclear power plants in India</p> <p>Hazards in nuclear power plants and safety measures ,Nuclear waste disposal</p>			7
Unit –III	<p>Diesel Power Plants :- Elements of a diesel power plant ,Building and general layout ,Use of diesel engine with steam power plants ,Applications of diesel power plants ,Limitation of diesel power plants</p> <p>Gas Turbine Plants :- ,Classification and application ,Elementary description of gas turbines ,Details of elements of a gas turbine plant and plant layout ,Advantages over thermal and diesel power plants</p>			8
Unit –IV	<p>Power Plant Economics :- Elements of cost of power ,Factors affecting economics of generation and distribution of power ,Factors affecting choice and type of power plants on economics of power generation ,Simple numerical problems on cost of power generation.</p> <p>Renewable Energy Sources :- Present position of conventional energy sources in India Need for non-conventional energy sources, Various alternate energy sources – solar, biogas, wind, geothermal, tidal, Magneto hydro dynamic, thermo electric power etc.</p>			8
Unit –V	<p>Solar Energy :- Introduction to solar power ,Solar energy collectors ,Application of solar energy ,Solar water heating ,Solar heating of Buildings ,Solar thermal electric conversion ,Solar photo voltaic, Solar distillation ,Solar green house ,Space cooling Solar energy storage ,Thermal storage ,Chemical storage ,Mechanical energy storage ,Solar pond</p> <p>Wind Energy :- Scope of wind energy ,Merits and demerits of wind energy Measurement of wind velocity by Anemometer : Indicating and recording type Wind Machines ,Horizontal axis wind machine ,vertical axis wind machine ,Wind power and energy pattern factor ,Efficiency of wind machine ,Site selection of wind machine</p>			6
<p>Text Book:-</p> <ol style="list-style-type: none"> 1. Power Plant Engineering (Hindi) R.L.Agrawal 2. Power Plant Engineering (Hindi) Prakash & Kumar 3. Non Conventional Sources of Energy (Hindi) By A.N Mathur/ N.S rathore 4. Non Conventional Sources of Energy (Hindi) Agrawal & Gupta (Nav Bharat) 5. Power Plant Engineering Dr. Mahesh Verma 6. Non Conventional Energy Sources G.D. Rai (Khanna Pub.) <p>Reference Book :-</p> <ol style="list-style-type: none"> 1. Power Plants Engineering P.K. Nag (TMH) 2. Energy Technology – Non Conventional S.Rao (Khanna Pub.) 				

6DAE06: AUTO ELECTRIC EQUIPMENTS LAB	L:T:P 0:0:2
<ol style="list-style-type: none"> 1. To study the constructional details of lead acid battery, also study various causes of failures. 2. To conduct various tests to determine the condition of battery 3. To study the various components of charging system 4. To study the regulator and conduct various adjustments and settings 5. Study of starting system 6. Study of Ignition system and setting procedure 7. Study of Light and sound system 8. ignition system : 8.1 Spark plug cleaning, setting and testing 8.2 CB point cleaning and ignition timing adjustment 9. Practice to read, the wiring diagram of different vehicles and to trace fault in electrical circuit and different electrical components. 10. Study of different type of transducers. 	

6DME07: CNC MACHINES & AUTOMATION LAB II Cr., L:T:P	2,0:0:2	
	<ol style="list-style-type: none"> 1. To prepare part programming for plain turning operation. 2. To prepare part programming for turning operation in absolute mode. 3. To prepare part program in inch mode for plain turning operation. 4. To prepare part program for taper turning operation. 5. To prepare part program for turning operations using turning cycle. 6. To prepare part program for threading operation. 7. To prepare part program for slot milling operation. 3. Industrial Visit 	

6DAE08	VEHICLE TECHNOLOGY LAB	L:T:P	0:0:2	
	<ol style="list-style-type: none"> 1. Study of Air power brakes used in heavy vehicle. 2. Study of transaxle unit of a car. 3. Tyre study and service: <ol style="list-style-type: none"> 3.1 To study the construction of radial and cross ply tyres. 3.2 Tyre rotation, and tyre retraining. 3.3 Repair of tubes and tyre. 3.4 Study of cold retreading procedure 4. Balancing of the wheel of a vehicle. 5. Study, checking and adjusting the steering system. <ol style="list-style-type: none"> 5.1 Steering linkage check. 5.2 Front wheel bearing 5.3 Ball joints 5.4 Steering gear box. 6. Study and checking the front wheel geometry by wheel alignment unit. 7. Study of cylinder liner, head, block and oil pan . 8. Measurement of cylinder liner ovality and taper. 9. Study of piston, piston rings, piston pins, connecting rod and crank shaft. 10. Study of different valve operating and cam driving mechanisms. 			

6DAE09	AUTOSHOP AND GARAGE PRACTICE	L:T:P	0:0:2	
	<ol style="list-style-type: none"> 1. Study of layout of Auto shop and Garage. 2. Study and operations of the auto shop equipment. 3. Study and uses of vehicle tools. 4. Prepare measurement sheet for cylinder, piston, connecting rod and crank shaft. 5. Cylinder Liner removing and fitting, Boring the cylinder by boring machine and Lapping and honing of the cylinder. 6. Repairing of cylinder head, Refinishing of cylinder head by surface grinder and Testing for leakage. 7. Repairing of cylinder block surface, Boring of main journal, cam shaft journal by line boring machine. 8. Checking of twist and bend with the help of connecting rod alignment machine and rectifying the defects. 9. Inspection of crank shaft for bend, taper and ovality of main journal and crank pins, Grinding of crank shaft by crank shaft grinder. 10. Overhauling and testing of F.I. pump with the help of F.I. pump calibration machine. 11. Complete overhauling and Testing of injector. 12. Servicing of vehicles. 13. Inspection of brake drum, Turning of brake drum by brake drum turning machine and Complete overhaul of braking system (L.T.V. & H.T.V). 14. Complete overhaul of suspension system - (Two wheeler, L.T.V. & H.T.V). 15. Complete overhaul of clutch system (Two wheeler, L.T.V. & H.T.V). 16. Complete overhaul of gear box (Two wheeler, L.T.V. & H.T.V). 17. Complete overhaul of Propeller shaft "U" joints and Centre bearing. 18. Complete overhaul of Differential (L.T.V. & H.T.V). 19. Complete overhaul of steering system (L.T.V. & H.T.V). 20. Complete tune up of Engine by tuning equipment. 21. Driving practice of two wheeler, L.T. V & H.T. V. 22. Repairing, Servicing and testing of Radiator. 			

Note - Visit to Nearby Auto Workshop for conducting those practical which are not feasible in institute.

6DAE10	PROJECT			
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