

(Deemed to be University Estat. *u/s* 30 fibe UGC Act, 1956) PALLAVARAM - CHENNAI ACCREDITED BY NAAC WITH 'A' GRADE Marching Beyond 25 Years Successfully

B.E Automobile Engineering

Curriculum and Syllabus

(Based on Choice Based Credit System) Effective from the Academic Year **2018-2019**

Department of Automobile Engineering School of Engineering



ENGLISH

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COURSE OUTCOMES:(Skill Development)

CO1: To develop the language proficiency of a technical under-graduate in English with emphasis on Learn, Speak, Read and Write skills.

CO2: To develop the ability to speak effectively in English in real life situations.

CO3: To implement learning environment to practice listening, speaking, reading and writing skills.

CO4: To understand the tasks and activities through guided instructions and materials.

CO5: To Inculcate reading habit and to develop effective reading skills.

UNITI VOCABULARY BUILDING

GeneralVocabulary-Nouns-Compoundnouns, Word borrowing& Word making,Foreign machineryinEnglish,Dictionary and Thesaurus usages, Synonyms , Antonyms, PrefixesandSuffixes, Homonyms, HomographsandHomophones,Changingwordsfromoneformtoanother,AcronymsandAbbreviations.

UNITII BASIC WRITING

Sentencesstructures-

Kindsofsentences, Typesofsentences, Clauses and Phrases, Punctuations, WordLinks and Connectives, Summarizing, Precise writing, ParagraphWriting.

UNITIII IDENTIFYINGCOMMONERRORS IN ENGLISH

Articles, Prepositions, Subject-verbAgreement, Pronouns- Relative pronouns, Demonstrative pronouns, Misplaced Modifiers, Redundancies, Clichés, Infinitives& Gerund

UNITIV NATUREANDSTYLE OF SENSIBLE WRITING

Describing people, place and situations, Process description, Definitions, Numerical Expressions, Information Transfer-Flowchart Bar chartandPie chart, Checklists, Writingintroductionandconclusion.

UNITV WRITING PRACTICES

LetterWriting-Formal&InformalLetters, ReportWriting-LetterReport, AccidentReport, InvestigationReportandSurvey, Essay writing, ComprehensionPassages.

TEXTBOOKS:

- 1. **'EnglishforScientists**, Prof.K.R.Lakshminarayanan, FormerHead, DepartmentofHumanitiesandSocialsciences, SriVe nkateshwaraCollegeofEngineering, Pennalur, Sriperumbudur, TamilnaduSCITECHPUBLICATIONS (INDIA PVT.LTD)2014
- 2. DepartmentofEnglish,AnnaUniversity,Mindscapes, 'EnglishforTechnologistsandEngineers',OrientLongmanPvt. Ltd,Chennai:2012.



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- 3. DepartmentofHumanitiesandSocialSciences,AnnaUniversity, 'EnglishforEngineersandTechnologists'CombinedE dition (Volumes1and2),Chennai:Orient LongmanPvt. Ltd.,2006.
- 4. DepartmentofEnglish,AnnaUniversity,Mindscapes, 'EnglishforTechnologistsandEngineers',OrientLongmanPvt. Ltd,Chennai:2012.
- 5. DepartmentofHumanitiesandSocialSciences,AnnaUniversity,"**EnglishforEngineersandTechnologists**"Combined Edition (Volumes1and2),Chennai:Orient LongmanPvt. Ltd.,2006.
- 6. M.AshrafRizvi, "EffectiveTechnicalCommunication", TataMcGraw-HillPublishingCompanyLimited, NewDelhi. 2009.

SuggestedReadings:

- (i) PracticalEnglishUsage.MichaelSwan.OUP.1995.
- (ii) RemedialEnglishGrammar.F.T.Wood.Macmillan.2007
- (iii) OnWritingWell.WilliamZinsser.HarperResourceBook.2001
- (iv) StudyWriting.LizHamp-LyonsandBenHeasly.CambridgeUniversityPress.2006.
- (v) CommunicationSkills.SanjayKumarand PushpLata.OxfordUniversityPress.2011.
- (vi) ExercisesinSpokenEnglish.Parts.I-III.CIEFL,Hyderabad.OxfordUniversityPress



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(IntroductiontoElectromagneticTheory)

COURSEOUTCOME: (Employability)

18BSAU11

CO 1: To Formulate general mechanics parameters between central and non-central forces.

CO 2:To learn the basicsoful trasonic.

CO3:To Understandingaboutthe Fiberoptics.

CO4:To Explaintypesofwavesandinterferenceoflight.

CO 5: To identify thermodynamic parameters and apply fundamental laws to solve thermodynamic problems.

UNIT-1:ELECTROSTATICS IN VACUUM

Coulomb'sinverse square law, Super position principle - Gauss theorem - proof and its application (intensity at apoint due to charged sphere and cylinder), Laplace's and Poisson's equations for electrostatic potential-potentialdifference-equipotentialsurface-potentialatapointdueto apointcharge.

UNIT-2: ELECTROSTATICS IN ALINEAR DIELECTRICMEDIUM

Electric dipole- potential energy of a dipole - Electric field due to an electric dipole (axial point and equatorial line) -Dielectric constant - Electric susceptibility - Types of polarization- point charge at centre of dielectric sphere in uniformmagneticfield-Lorentzmethod-ClausiusMosottiequation-Dielectricloss-Applicationsofcapacitorandtransformerindielectricmaterials

UNIT-3:MAGNETOSTATICS IN ALINEAR MAGNETIC MEDIUM

Bio-Savart law - magnetic induction at a point due to a straight conductor carrying current - magnetic field at centre of acircular coil carrying current- Ampere's circuital law and its application -Field along the axis of a circular coil andsolenoid. Intensity of magnetisation-Magnetic susceptibility-Magnetic permeability- Classification of magnetic materials-Domain theory offerromagnetism -BH curve.

UNIT-4: FARADAY'S LAW ANDMAXWELL'S EQUATION

Faraday's law - Differential form of Faraday's law – Self and Mutual inductance- Self-inductance of a long solenoid-Experimental determination of self-inductance (Rayleigh's method) and Mutual inductance - Maxwell's equations andtheir derivation – Physical significance of Maxwell's equation – Application – Refraction of radiowave in ionosphere(bending ofradiowaves).

UNIT-5:ELECTROMAGNETIC WAVES

The wave equation - Plane electromagnetic waves in vacuum, their transverse nature - Relation between electric and magnetic fields of an electromagnetic wave- Hertz experiment: production and detection of electromagnetic wave - Practical electromagnetism - Carbon microphone - Electrodynamic microphone - Condenser microphone and Crystalmicrophone.

TOTALHrs:45

TEXTBOOKS

- 1. R.Murugeshan, Electricity and Magnetism, S.Chand & Co, 2017
- 2. TaiL.Chow,IntroductionToElectromagneticTheory:AModernPerspective,LaxmiPublications(2012)

REFERENCEBOOKS:

- 1. DavidGriffiths, Introduction to Electrodynamics, Pearson Publishers, (2015)
- 2. HallidayandResnick,Physics,Wiley,(2015)
- 3. Dr.WayneM.Saslow, Electricity, MagnetismandLight, AcademicPress, (2002)



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COURSEOUTCOMES::(Skill Development) CO1:TointroducetheideaofapplyingdifferentialandintegralcalculustoNotionsofcurvatureandtoimproperintegrals.Apartfrom someapplicationsitgivesabasicintroductiononBetaandGammafunctions. CO2:TointroducethefalloutsofRolle'sTheoremthatisfundamentaltoapplicationofanalysistoEngineeringproblems. CO3:Todevelopthetoolofpowerseriesforlearning advancedEngineeringMathematics. CO4:Tofamiliarizethestudentwithfunctionsofseveralvariablesthatisessentialinmostbranchesofengineering.CO5:Todevelo ptheessentialtoolofmatrices inengineering. UNITI:CALCULUS 12 Evolutesandinvolutes-Evaluationofdefiniteandimproperintegrals-BetaandGamma functions and theirproperties UNITII:CALCULUS 12 Rolle's Theorem, Meanvalue theorems, Taylor's and Maclaurin theorems with remainders - indeterminate formsandL'Hospital'srule. UNITIII: SEQUENCESANDSERIES 12

Convergence of sequence and series, tests for convergence- Power series, Taylor's series, series for exponential, trigonometricand logarithm functions.

UNITIV: MULTIVARIABLECALCULUS(DIFFERENTIATION)

Limit, continuity and partial derivatives, directional derivatives, total derivative-Tangentplane Maxima, minimaandsaddlepoints-Methodof Lagrangemultipliers.

UNITV:MATRICES

Introduction to matrix and rank of a matrix-System of linear equations- Symmetric, skew- symmetric and orthogonalmatrices-Eigenvalues eigenvectors-Diagonalizationofmatrices-Cayleyand HamiltonTheorem, and Orthogonal transformation.

TEXTBOOKS 1. G.B.ThomasandR.L.Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

2. RamanaB.V., HigherEngineeringMathematics, TataMcGrawHillNewDelhi, 11, Reprint, 2010

REFERENCEBOOKS

- 1. Erwinkreyszig, Advanced EngineeringMathematics, 9thEdition, JohnWiley& Sons, 2006.
- VeerarajanT., EngineeringMathematicsforfirstyear, TataMcGraw-Hill, NewDelhi, 2008.
- 3. D.Poole,LinearAlgebra:AModernIntroduction,2ndEdition,Brooks/Cole,2005.
- 4. N.P.BaliandManishGoyal,AtextbookofEngineeringMathematics,LaxmiPublications,Reprint,2008.
- 5. B.S.Grewal, HigherEngineeringMathematics, KhannaPublishers, 36thEdition, 2010.

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MATHEMATICS-I (CalculusandLinearAlgebra)

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TOTAL:60Hrs.

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Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, powerfactorimprovementandbatterybackup.

TEXT/REFERENCES:

- 1. D.P.KothariandI.J.Nagrath, "BasicElectricalEngineering", TataMcGrawHill, 2010. 2. D.C.Kulshreshtha, "BasicElectricalEngineering", McGrawHill, 2009. 3. L.S.Bobrow, "FundamentalsofElectricalEngineering", OxfordUniversityPress, 2011. 4. E.Hughes, "ElectricalandElectronicsTechnology", Pearson, 2010.
- 5. V.D.Toro, "ElectricalEngineeringFundamentals", PrenticeHallIndia, 1989.

BridgeRectifier, Single Phase voltage source inverters. UNITV **ELECTRICAL INSTALLATIONS**

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables,

UNITIII TRANSFORMERS

Magneticmaterials,BHcharacteristics,idealandpracticaltransformer,equivalentcircuit,lossesintransformers,regulationande fficiency.Auto-transformer andthree-phasetransformer connections.

UNITIV **ELECTRICALMACHINES & POWER CONVERTERS**

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance oftorque-slip characteristic. Single phase induction motor. Construction, working, torque-speed characteristic and speedcontrol of separately excited dc motor. DC-DC buck and boost converters, duty ratio control. Single phase

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BASICELECTRICAL ENGINEERING COURSEOUTCOMES: (Employability)

Aftersuccessfulcompletion of the BasicElectrical Engineeringcourse, the student will be able to

- CO1: Applythebasicsofelectricalcircuitsandmeasurements.
- CO2: Use the Ohm's and Kirchhoff's Laws.
- CO3: Understandtheprincipleandconstructionof DCmotorandgenerator.
- CO4: Remember the principle and construction of single phase and three phase induction motors.

UNITI DCCIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, Mesh and Nodalanalysis, Analysis of simple circuits with dc excitation, Wye↔Delta Transformation, Superposition, Thevenin andNortonTheorems. Time-domain analysisoffirst-order RLandRCcircuits.

UNITII ACCIRCUITS

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations(seriesandparallel), resonance. Threephasebalancedcircuits, voltageandcurrentrelations instarand deltaconne ctions.

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TOTALHrs:60

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COURSEOUTCOMES: (Employability)

- CO1: Construct the various types of projection.
- CO2: Use the conventions and the methods of engineering drawing.
- CO3: Improve their visualization skills so that they can apply these skills in developing new products.
- CO4: Apply the simple layout of factory buildings.
- CO5: Impart and inculcate a proper understanding of the theory of projection.

CONCEPTSANDCONVENTIONS(NotforExamination)

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layoutandfolding of drawing sheets - Lettering and dimensioning.

UNITI INTRODUCTIONTO ENGINEERINGDRAWINGANDPLANE CURVES

Curvesused inengineering practices:Conics-Constructionofellipse,Parabolaandhyperbolabyeccentricitymethod - Construction of cycloid, Epicycloid, Hypocycloid - construction of involutes of squad and circle - Drawing of tangentsandnormalto the abovecurves. Scales -Plain, DiagonalandVernierScales.

UNITII PROJECTIONOF POINTS, LINES ANDPLANE SURFACES

Projection of points and straight lines located in the first quadrant - Determination of true lengths and true inclinations - Projectionofpolygonalsurfaceandcircular laminainclinedtobothreference planes-Auxiliary Planes

UNITIII PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane bychangeofpositionmethod -AuxiliaryViews

UNITIV SECTIONOF SOLIDS AND DEVELOPMENT OF SURFACES

Sectioningofabovesolidsinsimpleverticalpositionbycuttingplanesinclinedtoonereferenceplaneandperpendicular to the other - Obtaining true shape of section - Auxiliary Views. Development of lateral surfaces of simpleand truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindricalcutouts, perpendicularto the axis.

UNITV ORTHOGRAPHICPROJECTION ANDISOMETRIC PROJECTION

Free hand sketching: Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement - layout views – Developing visualization skills through freehandsketching ofmultiple viewsfrom pictorialviews of objects.

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

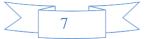
TOTAL:60PERIODS

TEXTBOOKS:

1. N.D.Bhatt, "EngineeringDrawing" Charotar PublishingHouse, 46th Edition, (2003).

REFERENCES:

- 1. K.V.Natrajan, "AtextbookofEngineeringGraphics", DhanalakshmiPublishers, Chennai (2006).
- 2. M.S.Kumar, "EngineeringGraphics", D.D.Publications, (2007).
- 3. K.Venugopal& V.PrabhuRaja, "Engineering Graphics", NewAge International(P) Limited (2008).
- 4. M.B.ShahandB.C.Rana, "EngineeringDrawing", PearsonEducation (2005).
- 5. K.R.Gopalakrishnana, "EngineeringDrawing" (Vol.I&II), SubhasPublications (1998).
- DhananjayA.Jolhe, "EngineeringDrawingwithanintroductiontoAutoCAD" TataMcGrawHillPublishingCompanyLimited (2008).
- 7. BasantAgarwalandAgarwalC.M., "EngineeringDrawing", TataMcGrawHillPublishingCompanyLimited, NewDelhi, (



2008).

PublicationofBureauofIndianStandards:

- 1. IS10711-2001:TechnicalproductsDocumentation- Sizeandlayoutofdrawingsheets.
- 2. IS9609(Parts0&1)-2001:TechnicalproductsDocumentation-Lettering.
- 3. IS10714(Part20)- 2001&SP46-2003:Linesfortechnicaldrawings.
- 4. IS11669-1986&SP46-2003:DimensioningofTechnicalDrawings.
- 5. IS15021(Parts1to4)- 2001:Technicaldrawings-ProjectionMethods.

SpecialpointsapplicabletoUniversityExaminationsonEngineeringGraphics:

- $1. \ There will be five questions, each of either or type covering all units of the syllabus.$
- 2. Allquestionswill carryequalmarksof20eachmakingatotalof100.
- 3. TheanswerpapershallconsistofdrawingsheetsofA3sizeonly.Thestudentswillbepermittedtouseappropriatescale to fit solution withinA3 size.
- 4. Whenever

thetotalnumberofcandidatesinacollegeexceeds150, the University Examination in that college will be conducted intwo sessions (FN and AN on the same day) for 50 percent of student (approx) at a time.



PHYSICSLAB

COURSE OUTCOMES: (Skill Development)

- CO1: To Design and Conduct experiments as well as to Analyze and Interpret Data.
- CO2: To Identify, Formulate, and Solve Engineering Problems.
- CO3: To use Techniques and Skills associated with Modern Engineering Tools such as Lasers and Fiber Optics.
- CO4: To Provide pre requisite hands-on experience for engineering laboratories.

CO5: To understand the basic physics concepts and study the Young's modulus of the uniform and nonuniform bending of the materials.

LIST OF EXPERIMENTS (Any'8')

- 1. Deflectionmagnetometer-TanAnulldeflectionmethod
- 2. Deflectionmagnetometer-TanBnulldeflectionmethod 3.

Deflectionmagnetometer-TanAequaldeflectionmethod

- 4. Laser-determinationofwavelengthandparticlesize
- 5. Potentiometer-CalibrationofLowrangevoltmeter
- 6. Determinationofbandgapofasemiconductordiode
- 7. Spectrometer Grating
- 8. Spectrometer- Dispersivepowerofprism
- 9. Torsional Pendulum
- 10. UltrasonicInterferometer.

TOTAL:30Hrs



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ELECTRICAL ENGINEERING LAB

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COURSEOUTCOMES:(Skill Development)

- **CO1:** Evaluatepowerinthreephasecircuits.
- CO2: Distinguishbetweentheeffectsof Eddycurrentandhysteresislossesinmagneticmaterials.
- CO3: MeasureperformancecharacteristicsofDCgeneratorsandthree-phaseinductionmotors.
- **CO4:** Perform power transformer open and short circuit tests and determine the values of elements of the equivalent circuit.
- CO5: Understand theexperimentsformeasuringcharacteristicsofdifferentsemiconductordiodes.

LIST OF LABORATORY EXPERIMENTS/DEMONSTRATIONS:

1. Basic safety precautions. Introduction and use of measuring instruments - voltmeter, ammeter, multi-

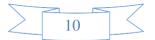
meter, oscilloscope. Real-liferesistors, capacitors and inductors.

- 2. SinusoidalsteadystateresponseofR-L, and R-C circuits-impedance calculation and verification.
- 3. ResonanceinR-L-Ccircuits.
- 4. Loadingofatransformer:measurementofprimaryandsecondaryvoltagesandcurrents,andpower
- 5. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (linelinevoltage, phase-to-neutralvoltage, lineandphasecurrents).
- 6. LoadCharacteristicsofaDCMotor
- 7. Torque-SlipCharacteristicofanInductionmotor
- 8. Threephaseinductionmotors-Directionreversalbychangeofphase-sequenceofconnections.

9. Demonstrationofdc-dcconverter.

- 10. Demonstrationofdc-acconverter.
- 11. Demonstrationofac-dcconverter.

TOTAL:30Hrs



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ENGLISHLAB

COURSEOUTCOMES: (Skill Development)

 $\label{eq:laboratory} After success ful completion of the Language Laboratory course, the student will be able to the laboratory course of the l$

- **CO1:** Developthe<mark>listeningcapability</mark>.
- CO2: Developthewritingcapabilitythroughthepractices.
- **CO3:** Use<mark>strongvocabulary</mark>andfluentlylikeforeigners.
- **CO4:** Preparetheir, ownresume in professional method.
- **CO5:** Understandthe Structure of presentation and the tools available in the power point presentation.

ORALCOMMUNICATION

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(Thisunitinvolvesinteractivepractice sessionsinLanguageLab)

Listening comprehensions, Pronunciation, Phonology, Intonation, Stress and Rhythm, Situational Dialogues, Communication in workplace, Interviews, Seminar, Formal Presentations, Group Discussions, Debates, JAMsessions

TEXTBOOKS:

1. Anderson, P.V, Technical Communication, Thomson Wadsworth, Sixth Edition, New Delhi, 2007.

2. Prakash, P, Verbaland Non-Verbal Reasoning, Macmillan India Ltd., Second Edition, New Delhi, 2004.

REFERENCES:

- 1. JohnSeely, TheOxfordGuidetoWritingandSpeaking,OxfordUniversityPress,NewDelhi,2004.
- 2. Evans, D, Decisionmaker, Cambridge University Press, 1997.
- 3. Thorpe, E, and Thorpe, S, Objective English, Pearson Education, Second Edition, New Delhi, 2007.
- 4. Turton, N. DandHeaton, J. B, Dictionary of Common Errors, Addison Wesley.



18BSAU21

CHEMISTRY

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COURSE OUTCOMES: (Employability)

After successful completion of the Engineering Chemistry course, the student will be able to

CO1: Analyze microscopic chemistry in terms of atomic and molecular orbital and intermolecular forces.

CO2: Rationalize bulk properties and processes using thermodynamic considerations.

CO3: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.

UNITI ATOMICANDMOLECULAR STRUCTURE, INTERMOLECULARFORCES ANDPOTENTIAL ENERGYSURFACES

Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecularorbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystalfieldtheoryandtheenergyleveldiagramsfortransition metalionsandtheirmagneticproperties.

lonic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energysurfacesofH₃, H₂F andHCN.

UNITII SPECTROSCOPICTECHNIQUESANDAPPLICATIONS

Principles of spectroscopy and selection rules. Electronic spectroscopy. Vibrational and rotational spectroscopy ofdiatomicmolecules. Applications. Diffraction and scattering

UNITIIIUSEOFFREEENERGYINCHEMICALEQUILIBRIA

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy andemf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Waterchemistry.Corrosion.

UNITIVPERIODICPROPERTIES

TEXTBOOKS

Variationsofs, p, dandforbitalenergiesofatoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbersandgeometries, hardsoft acidsandbases, moleculargeometries.

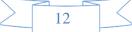
UNITVORGANICREACTIONSANDSYNTHESISOFADRUGMOLECULE

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings.Synthesisofacommonly useddrugmolecule.

TOTALHrs:60

1. Chemistry:PrinciplesandApplications,byM.J.SienkoandR.A.Plane.

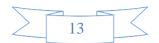
- 2. FundamentalsofMolecular Spectroscopy,byC.N.Banwell.
- 3. EngineeringChemistry(NPTELWeb-book),byB.L.Tembe,KamaluddinandM.S.Krishnan.



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REFERENCEBOOKS

- 1. PhysicalChemistry,byP.W.Atkins.
- 2. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition<u>http://bcs.whfreeman.com/vollhardtschore5e/default.asp</u>.
- 3. Universitychemistry,byB.H.Mahan.



18BSA	MU22 MATHEMATICS-II	L	т	Ρ	С
	(Calculus,OrdinaryDifferentialEquationsandComplexVariable)	3	1	0	4
CO1: To CO2:To CO3:To CO4:To	EOUTCOMES:(Skill Development) pimplementtheideaofapplyingi n t e g r a lcalculus. evaluateDifferentialequations inengineering developtheordinarydifferentialequationfor learning advanced EngineeringMathematics. understandwithfunctionsofseveralvariablesthatisessentialinmostbranchesofengineering. develop theessentialtoolofcomplex variable(Integration) inengineering.				
Multiple variable	: MULTIVARIABLECALCULUS(INTEGRATION) Integration: Double integrals (Cartesian)-change of order of integration in double integration in double integrates (Cartesian to polar)- Triple integrals(Cartesian)-orthogonal curvilinear coordinates- Green , s(statementonly)-Simpleproblems.				
Exact,lir	FIRST ORDERORDINARY DIFFERENTIALEQUATIONS learandBernoulli'sequations, Euler'sequations, Equations not of first degree: equations solvable for put of the uations solvable for x and Clair aut's type.	,equa	12 tionss	olvab	I
Second	DRDINARYDIFFERENTIALEQUATIONSOFHIGHERORDERS order linear differential equations with variable coefficients, method of variation of par uation;Powerseriessolutions;Legendrepolynomials,	amete	12 ers, (Cauch	ıy-
Differen analytic	COMPLEXVARIABLE–DIFFERENTIATION tiation,Cauchy-Riemannequations,analyticfunctions,harmonicfunctions,findingharmonicconjug functions (exponential,trigonometric,logarithm) and their pro gs,Mobiustransformationsandtheir properties.			ntary nform	al
Contour Taylor's	COMPLEXVARIABLE–INTEGRATION integrals,Cauchy-Goursattheorem(withoutproof),CauchyIntegralformula(withoutproof)- series,zerosofanalyticfunctions,singularities,Laurent'sseries;Residues,CauchyResiduetheorem of definiteintegralinvolvingsineandcosine.	(witho	12 utpro	of),Ev	,
	TOTAL:	60Hrs	6.		
 G.B Erw W.E W.E S.L E.A 	EFERENCEBOOKS ThomasandR.L.Finney,CalculusandAnalyticgeometry,9thEdition,Pearson,Reprint,2002. rinkreyszig,AdvancedEngineeringMathematics,9thEdition,JohnWiley&Sons,2006. E.BoyceandR.C.DiPrima,ElementaryDifferentialEquationsand Boundary ValueProblems,WileyIn .Ross,DifferentialEquations,3rdEd.,WileyIndia,1984. .Coddington, An Introduction toOrdinaryDifferentialEquations,PrenticeHallIndia,1995. 	ndia,2	009.		

- 6. E.L.Ince, Ordinary Differential Equations, Dover Publications, 1958.
- 7. J.W.BrownandR.V.Churchill,ComplexVariablesandApplications,7thEd.,Mc-GrawHill,2004.
- 8. N.P.BaliandManishGoyal,AtextbookofEngineeringMathematics,LaxmiPublications,Reprint,2008. th Edition,2010.
- 9. B.S.Grewal, HigherEngineeringMathematics, KhannaPublishers, 36

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CO2.To use the orderoftime complexityofalgorithms. CO3.To complete programsinvolvingcontrolinstructions, arrays, structures and unions.

PROGRAMMING FOR PROBLEM SOLVING

CO4.To Usestringmanipulations using Cprogrammingconstructs.

CO1.To Implement theprinciplesofalgorithm and pseudocode.

CO5.To recall fileoperationsinCprogramming

Attheendofthiscourse, theStudentwillbeableto

COURSEOUTCOME: (Employability)

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UNITI INTRODUCTION TO PROGRAMMING

Introduction to Programming (Flow chart/pseudo code, compilation etc.), Variables (includingdata types) -Arithmeticexpressions and precedence, Conditional Branching and Loops -Writing and evaluation of conditionals and consequentbranching-Iteration and loops

Arrays (1-D, 2-D), Character arrays and Strings, Searching, Basic Sorting Algorithms, Finding roots of equations,

UNITIIARRAYSANDBASICALGORITHMS

Notionoforderoftime complexity through example programs

UNITIII FUNCTION ANDPOINTERS

Functions (including using built in libraries), Parameter passing in functions, call by value ,Passing arrays to functions: idea of call by reference, Recursion with example programs such as Finding Factorial, Fibonacci series, etc. Pointers -Definingpointers, Use of Pointers inself-referential structures

UNITIVSTRUCTURES ANDUNIONS

Structures - Defining structures and Array of Structures, Structures containing Pointers, Unions - Storage classes: auto,static,extern,register -Dynamicmemoryallocation

UNITVSTRING FUNCTIONS ANDFILES

Strings-librarystringfunctions, pointersinstrings, pointersandfunctionarguments, FilesfileOperations,processingafile,Preprocessordirectives,useoftypedef,Commandlinearguments,Enumerated datatypes.

TEXTBOOKS:

- 1. ByronGottfried, "Schaum's OutlineofProgramming withC", McGraw-Hill
- 2. E.Balaguruswamy, "ProgramminginANSIC", TataMcGraw-Hill

REFERENCES:

- 1. BrianW.KernighanandDennisM.Ritchie, "TheCProgrammingLanguage", PrenticeHallofIndia
- 2. YashavantKanetkar, "Let UsC", BPBPublications
- 3. Ashok.N.Kamthane, "Computer Programming", Pearson Education (India)



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CHEMISTRYLAB

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COURSEOUTCOME(Skill Development)

CO 1:To estimate the rate constants of reactions, freezing point depression and partial coefficient of immiscible liquids.

CO 2:ToSynthesizeasmalldrugmoleculeandanalyseasaltsample.

CO 3:Tofindtheviscosityandpartitioncoefficientofasubstance.

CHOICEOF10-12EXPERIMENTSFROMTHEFOLLOWING

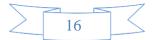
- 1. Determinationofsurfacetensionandviscosity
- 2. Thinlayerchromatography
- 3. Ionexchangecolumnforremovalofhardnessofwater
- 4. Determinationofchloridecontentofwater
- 5. Colligativepropertiesusingfreezingpointdepression
- 6. Determinationoftherateconstantofareaction
- 7. Determinationofcellconstantandconductanceofsolutions
- 8. Potentiometry-determinationofredoxpotentialsandemfs
- 9. Synthesisofapolymer/drug
- 10. Saponification/acidvalueofanoil
- 11. Chemicalanalysisofasalt
- 12. Latticestructuresandpackingofspheres
- 13. Modelsofpotentialenergysurfaces
- 14. Chemicaloscillations-lodineclockreaction
- 15. Determinationofthepartitioncoefficientofasubstancebetweentwoimmiscibleliquids
- 16. Adsorptionofaceticacidbycharcoal
- 17. Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH ofminimumviscosityforgelatinsolsand/orcoagulation ofthewhitepartofegg.

TEXTBOOKS

- 1. S.SundaramandK.Raghavan"PracticalChemistry", S.Viswanathan.Co.3rdedition**2011**.
- 2. Gnanaprakasam, Ramamurthy, "Organic Chemistry Lab Manual" S. Viswanathan Pvt. Ltd. 3rd edition 2011

REFERENCEBOOKS

- 1. Vogel's-"TextbookofqualitativeorganicAnalysis",Longmann,12thedition,2011
- 2. J.N.GurtuandR.Kapoor"Advanced experimentalChemistry", S.ChandandCo.6thedition, 2010



18ESAU22 PROGRAMMINGFORPROBLEMSOLVINGLAB

L	Т	Ρ	С
0	0	4	2

COURSEOUTCOME: (Skill Development)

- CO1. Familiarizewiththe ProgrammingEnvironment.
- CO2. DevelopprogramsusingvariouscontrolinstructionsandoperatorprecedenceinCProgramming.
- CO3. Implement stringmanipulations, arraysandfunctions forvarious applicationsinC.
- CO4. Analyze the use of structures, unions and pointers in
- C.CO5. Handlevarious file operationsinC.

LIST OF EXPERIMENTS:

- 1. Familiarizationwithprogrammingenvironment
- 2. Simplecomputationalproblemsusingarithmeticexpressions
- 3. Problemsinvolvingif-then-elsestructures
- 4. Iterativeproblems
- 5. 1DArray manipulation
- 6. Matrixproblems
- 7. Stringoperations
- 8. Simple functions
- 9. SolvingNumericalmethodsproblems
- 10. Recursivefunctions
- 11. Pointersandstructures
- 12. Fileoperations



18ESAU23 WORKSHOP/MANUFACTURINGPRACTICES(THEORY&LAB.)

L	Т	Ρ	С
1	0	4	3

COURSE OUTCOMES: (Skill Development)

After successful completion of the Engineering Practices Laboratory course, the student will be able to

- CO1: To Produce various joints in the given object with the available work material.
- CO2: To judge how much time a joint will take for the assessment of time.
- CO3: To examine different types of woods used and tools used in wood Working technology.
- CO4: To explain different types of tools used in sheet metal working.
- CO5: To recall the Developments of sheet metal jobs from GI sheets, knowledge of basic concepts of soldering.

Workshop/Manufacturing Practices [[L : 1; T:0; P : 0 (1

credit)]Lectures&videos:(10 hours)

Detailedcontents:

- 1. ManufacturingMethods- casting,forming,machining,joining,advancedmanufacturingmethods(3lectures)
- 2. CNCmachining,Additivemanufacturing(1lecture)
- 3. Fittingoperations&powertools(1lecture)
- 4. Electrical&Electronics(1lecture)
- 5. Carpentry(1lecture)
- 6. Plasticmoulding, glasscutting(1 lecture)
- 7. Metalcasting(1lecture)
- 8. Welding(arcwelding&gaswelding),brazing(1lecture)

(ii)WorkshopPractice: (60hours)[L:0;T:0;P: 4(2credits)]

1. Machineshop(10hours)

TomakeFacingandplainturning, stepturning, drilling in the lathe

2. Fittingshop(8hours)

 ${\tt Tomakesquare, Vjoint in bench fitting as perthegiven dimension and {\tt Tolerances}}$

3. Carpentry(6hours)

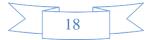
Tomakehalflapjoint,dovetail,TEELapjoint

4. Electrical & Electronics (8 hours)

- (i) Tomakefluorescentlampwiring.
- (ii) Tomakestaircasewiring.
- (iii) Tomakeresidentialwiring.
- (iv) TomeasurePeak-peak,rms,period,frequencyusingCRO.
- (v) TosoldercomponentsdevicesandcircuitsbyusinggeneralpurposePCB.

5. Weldingshop(8 hours (Arcwelding 4hrs +gas welding 4hrs)

 Tomakesingle,butt,lapandTfilletjointbyarcweldingwiththebackhandandforehandweldingtechniquesasperthe givendimensions.



6. Plumbing Works

- Studyofpipelinejoints,itslocationandfunctions:valves,taps,couplings,unions,reducers,elbowsinhouseholdfittings.
- Basicpipeconnections-Mixedpipematerialconnection- Pipeconnectionswithdifferentjoiningcomponents.

7. Sheet Metal Work

TomakesimpleDustpan,RectangulartraysinsheetmetalwiththejigsasperthegivenDimensions.

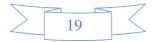
18MCAU21	CONSTITUTION OF INDIA	L	Т	Ρ	С
		0	0	0	0

COURSE OUTCOME:[EMPLOYABILITY]

- To invent the basic concepts of constitution law.
- To Justify the Perspective of the Constitution of India
- To Classify the fundamental rights.
- To Apply the concepts of Fundamental duties and its Legal Status.
- To describe the Parliamentary form of Government in India

COURSE CONTENT

- 1. Meaningoftheconstitution lawandconstitutionalism
- 2. HistoricalperspectiveoftheConstitutionofIndia
- 3. SalientfeaturesandcharacteristicsoftheConstitutionofIndia
- 4. Schemeofthe fundamental rights
- 5. TheschemeoftheFundamentalDutiesanditslegalstatus
- 6. TheDirectivePrinciplesofStatePolicy-Itsimportanceandimplementation
- 7. FederalstructureanddistributionoflegislativeandfinancialpowersbetweentheUnionandtheStates
- 8. ParliamentaryFormofGovernmentinIndia-Theconstitution powersandstatus of the PresidentofIndia
- 9. AmendmentoftheConstitutionalPowersandProcedure
- 10. The historical perspectives of the constitutional amendments in India
- 11. EmergencyProvisions:NationalEmergency,PresidentRule,Financial Emergency
- 12. LocalSelfGovernment-ConstitutionalSchemeinIndia
- 13. SchemeoftheFundamental RighttoEquality
- 14. SchemeoftheFundamentalRighttocertainFreedomunderArticle19
- 15. ScopeoftheRighttoLifeandPersonalLibertyunderArticle21



18BSAU31

MATHEMATICS-III(FOURIER SERIES AND TRANSFORMS)

Course Outcome: (Skill Development)

- To implement the Fourier series representation of periodic signals. The analysis of signal is far more convenient in the frequency domain.
- To select the Fourier series for different types of functions.
- To classify the Fourier Transform.
- To solve and obtain the solution of wave, heat equation
- To explain the Problems of Fourier series and Fourier transforms used in engineering applications.CO5:Students understand the z-transforms and its properties

UNITI FOURIER SERIES

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosineseries–Parseval's identity–HarmonicAnalysis.

UNITIIFOURIER TRANSFORM

Fourier integral theorem (without proof) – Fourier transform pair – Fourier Sine andCosinetransforms–Properties–Transformsofsimplefunctions–Convolutiontheorem– Parseval'sidentity.

UNITIIIPARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations - singular integrals -

Solutionsofstandardtypesoffirstorderpartialdifferential equations – Lagrange's linear equation -Linear partial differential equations of second and higher order withconstantcoefficients ofhomogeneousfunctions.

UNITIVAPPLICATIONSOFPARTIAL DIFFERENTIALEQUATIONS

Classification PDE-Method of separation of variables – One dimensionalwave and heat equation – Steady statesolutionoftwo-dimensional heatequation(square plateonly).

UNITVZ - TRANSFORMANDDIFFERENCEEQUATIONS

Z-transform–Introduction-properties–InverseZ-transform(usingpartialfractionandresidues)– Convolutiontheorem -Formation of difference equations – Solution of difference equations using Ztransform.

TEXTBOOKS:

- 1. Grewal.B.S, "HigherEngineeringMathematics", KhannaPublications, Delhi, 43rdEdition, 2013.
- 2. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 6threprint,2008.

20

TOTAL:60Hours

12

12

12

12

REFERENCEBOOKS:

- Bali.N.P.andManishGoyal'ATextbookofEngineeringMathematics',LaxmiPublications,9thedition,20 11.
- 2. ErwinKreyszig, "AdvancedEngineeringMathematics", WileyIndia, 9thEdition, 2011.
- 3. 3.GlynJames, "AdvancedModernEngineeringMathematics", PearsonEducation, 3rdEdition, 2012.
- 4. SivaramakrishnaDas.P&Vijayakumari.C,ATextbookofEngineeringMathematics-III
- 5. Transformsandpartialdifferentialequations-A.Singravelu

18PCAU31 ENGINEERINGTHERMODYNAMICS	L	Т	Р	С
	3	0	0	3
Course Outcomest (Employability)				

Course Outcomes: (Employability)

- To implement the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.
- To justify the second law of thermodynamics to open and closed systems and calculate entropy and availability.
- To classify the Rankine cycle tos team power plant and compare few cycle improvement methods
- To use simple thermodynamic relations of ideal and real gases
- To explain theproperties of gas mixtures and moist air and its use in psychometric processes

UNITI BASIC CONCEPT AND FIRST LAW

Basic concepts - concept of continuum, macroscopic approach, thermodynamic systems - closed, open and isolated.Property, state, path and process, quasi-static process, work, modes of work, Zeroth law of thermodynamics – conceptof temperature and heat, Concept of ideal and real gases, First law of thermodynamics – application to closed and opensystems, internal energy, specific heat capacities, enthalpy, steady flow process with reference to various thermalequipments.

UNITII SECOND LAW ANDENTROPY

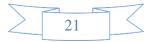
Second law of thermodynamics – Kelvin's and Clausius statements of second law, Reversibility and irreversibility.Carnot theorem, Carnot cycle, reversed carnot cycle, efficiency, COP, Thermodynamic temperature scale,

Clausiusinequality, conceptofentropy, entropyofidealgas, principleofincrease of entropy.

UNITIII THERMODYNAMIC AVAILABILITY

Basics-Energyinnon-flowprocesses: ExpressionsfortheEnergyofaclosedsystem-

Equivalencebetweenmechanical energy forms and Energy - Flow of energy associated with heat flow



12

12

Energy consumption and entropygeneration. Energy in steady flow processes: Expressions for
 Energy in steady flow processes – Energy dissipation and entropygeneration.

UNITIV PROPERTIES OF PURESUBSTANCE AND STEAM POWER CYCLE 12

Properties of pure substances – Thermodynamic properties of pure substances in solid, liquid and vapour phases,phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces, thermodynamic properties of steam. Calculations of workdoneandheattransferinnon-flow and flow processes, Standard Rankinecycle,Reheatandregenerativecycle.

UNITVPSYCHROMETRY

Psychrometry and psychrometric charts, property calculations of air vapour mixtures. Psychrometric process- Sensible heatexchange processes. Latent heatexchange processes. Adiabatic mixing, evaporative cooling, problems.

18ESAU31	ELECTRICAL DRIVES AND CONTROL	L 3	Т 0	P 0	C 3
COURSE OUTCOME <mark>:</mark>	[Employability]				
 To Design the elements 	ectrical drives and components				
 To Analyze with speed control of DC machines 					
 To Apply with speed control of AC machines 					
	ous starters and relays heating and power rating of drive motors				
UNIT I INTRODUCTION	N				9
Fundamentals of electri	ic drives - advances of electric drive-characteristics of loads - differe	ent types o	of me	<mark>chani</mark>	<mark>ca</mark> l
	stric drive - control circuit components: Fuses, switches, circuit breal	kers, conta	ctors	, Rela	ay -
control transformers.					

UNIT II SPEED CONTROL OF DC MACHINES

DC shunt motors - Speed Torque characteristics - Ward Leonard method, DC series motor - series parallel control - solid state DC drives - Thyristor bridge rectifier circuits- chopper circuits.

UNIT III SPEED CONTROL OF AC MACHINES

Induction motor - Speed torque Characteristics - pole changing, stator frequency variation - slip-ring induction motor - stator voltage variation - Rotor resistance variation, slip power recovery - basic inverter circuits- variable voltage frequency control.

UNIT IV MOTOR STARTERS AND CONTROLLERS



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DC motor starters: using voltage sensing relays, current sensing relays and time delay relays - wound rotor induction motor starters - starters using frequency sensing relays - DOI -starter and auto transformers starter.

UNIT V HEATING AND POWER RATING OF DRIVE MOTORS

Load diagram, over load capacity, insulating materials, heating and cooling of motors, service condition of electric drive - continuous, intermittent and short time - industrial application.

TEXT BOOKS:

1. N.K De and P.K Sen 'Electric Drives' Prentice Hall of India Private Ltd, 2002.

2. Vedam Subramaniam 'Electric Drives' Tata McGraw Hill, New Delhi, 2007.

3. V.K Mehta and Rohit Mehta 'Principle of Electrical Engineering', S Chand & Company, 2008.

REFERENCES:

1. S.K Bhattacharya Brinjinder Singh 'Control of Electrical Machines' New Age International Publishers, 2002.

2. John Bird 'Electrical Circuit theory and technology' Elsevier, First Indian Edition, 2006.

18PCAU32 **AUTOMOTIVE ENGINES** LTPC 3003

COURSE OUTCOME: [EMPLOYABILITY]:

- To Create the construction and operation of engines.
- To Analyze the Importance of cooling and its types
- To Examine the Importance and its type of Engines.
- To Evaluate with Supercharging, Turbo charging and Engine Testing
- To apply the various types of fuel injection systems

CONSTRUCTION AND OPERATION

Constructional details of spark ignition (SI) and compression ignition (CI) engines. Working principles. Two stroke SI and CI engines - construction and working. Comparison of SI and CI engines and four stroke and two stroke engines. Engine classification, firing order. Otto, diesel and dual cycles.

UNIT II FUEL SYSTEMS

Air fuel ratio requirements of SI engines, Air fuel ratio and emissions, working of a simple fixed venture carburetor, Constant vacuum carburetor. Diesel fuel injection systems-Jerk pumps, distributor pumps, pintle and multihole nozzles, Unit injector and common rail injection systems. Injection pump calibration. Need for a governor for diesel engines. Description of a simple diesel engine governor.

UNIT III COMBUSTION AND COMBUSTION CHAMBERS



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TOTAL 45 Hours

Introduction to combustion in SI and diesel engines and stages of combustion. Dependence of ignition timing on load and sped. Knock in SI and CI engines. Combustion chambers for SI and CI engines. Direct and indirect injection combustion chambers for CI engines. Importance of Swirl, squish and turbulence. Factors controlling combustion chamber design.

UNIT IV SUPERCHARGING , TURBOCHARGING AND ENGINE TESTING

Supercharging and Turbocharging, Different methods of turbocharging, Intercooling, Turbocharger controls including, waster gate, variable geometry, variable nozzle types. Dynamometers, Indicated thermal, brake thermal and volumetric efficiencies. Measurement of friction, Cylinder pressure measurement. Engine performance maps, Engine testing standards.

UNIT V COOLING AND LUBRICATION SYSTEMS

Need for cooling, types of cooling systems- air and liquid cooling systems. Thermosyphon and forced circulation and pressurized cooling systems. Properties of coolants. Requirements of lubrication systems. Types-mist, pressure fed, dry and wet sump systems. Properties of lubricants.

TOTAL: 45 Hours

9

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TEXT BOOKS:

- 1. Bosch "Automotive Handbook" 5th edition SAE publication 2000.
- 2. Kirpal Singh, "Automobile Engineering", Standard publishers, Distributors, Delhi, 1999.
- 3. G.B.S.Narang, "Automobile Engineering", Khanna Publishers, Twelfth reprint New Delhi, 2005.

18PCAU33MANUFACTURINGTECHNOLOGYLTPC3003

Course Outcome: (Employability)

- Todesigntheautomobilecomponentsproductionprocessesinvolvingin casting.
- To select the various welding processes.
- To classify the working and commonly performed operations in the machines.
- To apply the Characteristics of the forming and shaping processes.
- To explain the Principles and applications involved in Forging, Rolling, Extrusion.

UNITI CASTING

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Casting types, procedure to make sand mould, types of core making, moulding tools, machine moulding, specialmoulding processes – CO2 moulding; shell moulding, investment moulding,

24

permanent mould casting, pressure diecasting, centrifugal casting, continuous casting, casting defects.

UNITII WELDING

Classificationofweldingprocesses.PrinciplesofOxy-

acetylenegaswelding.A.Cmetalarcwelding,resistancewelding, submerged arc welding, tungsten inert gas welding, plasma arc welding, thermitwelding,electronbeamwelding,laserbeamwelding,defectsinwelding,solderingandbrazing.

UNITIII MACHINING

General principles (with schematic diagrams only) of working and commonly performed operations in the followingmachines: Lathe, Shaper, Planer, Horizontal milling machine, Universal drilling machine, Cylindrical grinding machine,Capstan and Turret lathe. Basics of CNC machines. General principles and applications of the following processes:Abrasive jet machining, Ultrasonic machining, Electric discharge machining, Electro chemical machining, Plasma arcmachining,Electron beammachining andLaserbeammachining.

UNITIV FORMINGANDSHAPINGOF PLASTICS

Types of plastics - Characteristics of the forming and shaping processes – Moulding of Thermoplastics – Workingprinciples and typical applications of - Injection moulding – Plunger and screw machines – Blow moulding – Rotationalmoulding – Film blowing – Extrusion - Typical industrial applications – Thermoforming – Processing of Thermosets –Working principles and typical applications -Compression moulding – Transfer moulding – Bonding of Thermoplastics –Fusionandsolvent methods –Induction andUltrasonicmethods

UNITV METALFORMING ANDPOWDER METALLURGY

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8

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7

Principles and applications of the following processes: Forging, Rolling, Extrusion, Wire drawing and Spinning, Powdermetallurgy–

Principalstepsinvolvedadvantages,disadvantagesandlimitationsofpowdermetallurgy.

TOTAL:45Periods

TEXTBOOKS:

- 1. HajraChoudhury, "ElementsofWorkshopTechnology", Vol.IandII, MediaPromotersandPublisher sPvt., Ltd., Mumbai, 2005.
- 2. NagendraParasharB.S.andMittalR.K., "ElementsofManufacturingProcesses", Prentice-HallofIndiaPrivateLimited, 2007.

REFERENCES:

- 1. Adithan.MandGupta.A.B., "ManufacturingTechnology", NewAge, 2006.
- 2. "H.M.T.ProductionTechnology–Handbook",TataMcGraw-Hill,2000.
- 3. Jain.R.K.andS.C.Gupta, "ProductionTechnology", KhannaPublishers. 16thEdition,2001.
- 4. Roy.A.Linberg, "ProcessandMaterialsofManufacture", PHI, 2000.
- 5. SeropeKalpajian,StevenR.Schmid,"ManufacturingProcessesforEngineeringMaterials",FourthE dition,PearsonEducation, Inc.2007.

18PCAU34

FLUIDMECHANICSANDMACHINERY



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Course Outcome: (Employability)

- To develop the importance of various types of flow in pumps and turbines
- To select the importance of dimensional analysis
- The distinguish of the conservation laws to flowthroughpipes and hydraulic machines arestudied.
- To apply the working of rotodynamicmachines.
- To explain the positive displacement machines.

UNITI INTRODUCTION

Units & Dimensions. Properties of fluids – Specific gravity, specific weight, viscosity, compressibility,
vapour pressureand gas laws – capillarity and surface tension. Flow characteristics: concepts of
system and control volume.Applicationofcontrolvolumetocontinuityequation,energyequation,momentumequationandmomentof
momentumequation.

UNITIIFLOW THROUGH CIRCULARCONDUITS

Laminar flow though circular conduits and circular annuli, Boundary layer concepts, Boundary layer thickness. Hydraulicand energy gradient, Darcy – Weisbach equation, Friction factor and Moody diagram, Commercial pipes, Minor losses, Flowthough pipesinseries and inparallel.

UNITIII DIMENSIONAL ANALYSIS

Dimension and units: Buckingham's Π theorem, Discussion on dimensionless parameters, Models and similitude,Navier-

Stokes equations Introduction of dimensionless parameters, Applications of dimensionless parameters.

UNITIV ROTODYNAMIC MACHINES

Homologous units, Specific speed, Elementary cascade theory, Theory of turbo machines, Euler's equation, Hydraulicefficiency,Velocity components attheentryandexitoftherotor.

Velocity triangle for single stage radial flow and axial flow machines, Centrifugal pumps, turbines, performance curvesforpumpsandturbines.

UNITVPOSITIVE DISPLACEMENTMACHINES

Reciprocating pumps Single acting, Double acting-advantages and disadvantages, Indicator diagrams, air vessels Warkaguadhuaimagaala Batammumna Classification Warkingnringinlaandnorformanasquuruss

Worksavedbyairvessels,Rotarypumps,Classification,Workingprincipleandperformancecurves.

TOTAL:45Hours

TEXTBOOKS:

1. Streeter.V.L.,andWylie,E.B.,FluidMechanics,McGrawHill,1983.



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2. Rathakrishnan.E,FluidMechanics,PrenticeHallofIndia(IIEd.),2007.

REFERENCES:

- 1. Ramamritham.S,FluidMechanics,HydraulicsandFluid Machines,DhanpatRai&Sons,Delhi,1988.
- 2. Kumar.K.L.,EngineeringFluidMechanics(VIIEd.)EurasiaPublishingHouse(P)Ltd.,NewDelhi,1995.

Bansal,R.K.,FluidMechanicsandHydraulics Machines,LaxmiPublications(P)Ltd.,NewDelhi.

18PCAU35 ELECTRONICS AND MICROPROCESSORS LAB L T P

COURSE OUTCOME:[SKILL DEVELOPMENT] To Evaluate the characteristics of PN Junction Diode To Examine the characteristics of CE Transistor, JFET and Uni Junction Transistor To Analyze the RC/Wein Bridge Oscillator and Logic Gates To Construct the Half Adder and Full Adder and Shift Registers, Counters and Operational Amplifier To organize the Block Transfer, 8 bit Addition, Subtraction

LIST OF EXPERIMENTS

ELECTRONICS

- 1.VI Characteristics of PN Junction Diode 2.VI Characteristics of Zener Diode
- 3.Characteristics of CE Transistor
- 4.Characteristics of JFET
- 5. Characteristics of Uni Junction Transistor
- 6.RC or Wein Bridge Oscillator
- 7. Study of Logic Gates (Basic Gates)
- 8. Half Adder and Full Adder
- 9. Shift Registers and Counters

10. Operational Amplifier (Adder, Subtractor, Differentiator, Integrator, Inverting and Non - Inverting

MICROPROCESSOR

- 1. Block Transfer
- 2. 8 bit Addition, Subtraction
- 3. Multiplication and Division
- 4. Maximum and Minimum of block of data
- 5. Sorting
- 6. Stepper Motor Interfacing

LIST OF EQUIPMENTS

2. Ammeters

3. PN Diode, BJT, JFET, Logic Gates, Shift Registers and Counters



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TOTAL: 45 Hours

5 No. 5 No.

5 No. 1 set.

4. Digital Logic Trainer Kits	1 No.
5. Breadboards	1 No.
6. Microprocessor Kits - 8085	5 No.
7. D/A Converter Interface	1 No.
8. Stepper Motor Interface	1 No.
9. CRO	1 No.
10. Wavefarm Generator	1 No.
11. Multimeter	1 No.



18PCAU36 FLUID MECHANICS AND STRENGTH OF MATERIALS LABORATORY

L	Т	Ρ	С
0	0	2	1

COURSE OUTCOME[SKILL DEVELOPMENT]

- To Analyze the mechanical properties of materials when subjected to different types of loading.
- To Examine the principles studied in Fluid Mechanics theory by performing experiments in lab.
- Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solidmaterials.
- Perform test on different fluid machinery.
- Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.

STRENGTH OF MATERIALS (30Hrs)

LIST OF EXPERIMENTS (Any Five of the following)

- 1. Tension test on a mild steel rod
- 2. Double shear test on Mild steel and Aluminium rods
- 3. Torsion test on mild steel rod
- 4. Impact test on metal specimen
- 5. Hardness test on metals Brinnell and Rockwell Hardness Number
- 6. Deflection test on beams
- 7. Compression test on helical springs

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Universal Tensile Testing machine with double 1 shear attachment - 40 Ton Capacity	1
2	Torsion Testing Machine (60 NM Capacity)	1
3	Impact Testing Machine (300 J Capacity)	1
4	Brinell Hardness Testing Machine	1
5	Rockwell Hardness Testing Machine	1
6	Spring Testing Machine for tensile and compressive loads (2500 N)	1

FLUID MECHANICS AND MACHINES LABORATORY (30Hrs)

LIST OF EXPERIMENTS (Any Five of the following)

- 1. Determination of the Coefficient of discharge of given Orifice meter.
- 2. Determination of the Coefficient of discharge of given Venturi meter.
- 3. Calculation of the rate of flow using Rota meter.
- 4. Determination of friction factor for a given set of pipes.
- 5. Conducting experiments and drawing the characteristic curves of centrifugal pump/ submergible pump
- 6. Conducting experiments and drawing the characteristic curves of reciprocating pump.
- 7. Conducting experiments and drawing the characteristic curves of Gear pump.

COURSE OUTCOME:

TOTAL: 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO.	NAME OF THE EQUIPMENT	Qty.
1	Orifice meter setup	1
2	Venturi meter setup	1
3	Rota meter setup	1
4	Pipe Flow analysis setup	1
5	Centrifugal pump/submergible pump setup	1
6	Reciprocating pump setup	1
7	Gear pump setup	1



18HSPD31

PERSONALITY DEVELOPMENT I

ТРС

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COURSE OUTCOME: [SKILL DEVELOPMENT]

To Apply the Features of Personality Development To Create Soft Skills in Action To Analyze Self Awareness and Self Esteem To Examine Self Motivation

SOFT SKILLS

UNIT I

Introduction to Personality Development - Meaning-Features of personality=Dimensions of Personality=Determinants of Personality-Features and Traits- Components of self concept-Barriers-Self analysis

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UNIT II SOF	FT SKILLS II 6	i
Importance of Soft	Skills – First impression-Work Place requirements-Discipline-Cleanliness-Hygiene-genera	I
AppearanceBuilding	Confidence–Concept of Thinking and Usage-Value of Time-Focus & Commitment.	

UNIT III SOFT SKILLS IN ACTION

Grooming - Attire - Understanding others- - Stability & Maturity Development - Strength s - Weakness -Opportunitiesthreats -Merits of SWOT Analysis-Components-how to convert weakness into strengths-Goal settings

UNIT IV SELF AWARENESS AND SELF ESTEEM

Definitions-Components of self awareness-Developing Self awareness-Self esteem-meaning-Steps to improve self esteem

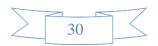
UNIT V SELF MOTIVATION

Motivation -Meaning-Techniques of self motivation-Motivation & goal setting - Motivation and emotion - Motivation at work.

Total: 30 Hours

REFERENCES:

- 1. Personality Development And Soft Skills---Barun K Mitra, Oxford Publication
- 2. Seven habits of Higly Effective people Stephen R. covey
- 3. Emotion, motivation and Self regulation Nathan C. Hall, McGill University, Canada, Thomas Goetz, University of Konstanz, Germany
- 4. http://www.emeraldgrouppublishing.com/
- 5. Psychology of Selfesteem Nathaniel Branden, Nash (1st edition), Jossey-Bass (32nd anniversary edition



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6

INDUSTRIAL SAFETY

LPT C

2 0 0 2

COURSE OUTCOME: [SKILL DEVELOPMENT]

To Create the safety in metal and wood working machinery To Organize the principles of machine guarding. To Examine the safety in welding and gas cutting To apply the safety in cold farming and hot working of metals. To Demonstrate with the safety in finishing, inspection and testing

SAFETY IN METAL WORKING MACHINERY AND WOOD UNIT I

WORKING MACHINES

General safety rules, principles, maintenance, Inspections of turning machines, boring machines, milling machine, planning machine and grinding machines, CNC machines.

UNIT II PRINCIPLES OF MACHINE GUARDING

Guarding during maintenance, Zero Mechanical State (ZMS), Definition, Policy for ZMS – guarding of hazards point of operation protective devices, machine guarding, types, fixed guard, interlock guard, automatic guard, trip guard, electron eye, positional control guard, fixed guard fencing- guard construction- guard opening. Selection and suitability: lathe-drilling-boring-milling -grinding-shaping

UNIT III SAFETY IN WELDING AND GAS CUTTING

Gas welding and oxygen cutting, resistances welding, arc welding and cutting, common hazards, personal protective equipment, training, safety precautions in brazing, soldering and metalizing – leak detection-pipe line safety-storage and handling of gas cylinders.

UNIT IV SAFETY IN COLD FARMING AND HOT WORKING OF METALS

Cold working, power presses, point of operation safe guarding, auxiliary mechanisms, feeding and cutting mechanism, hand or foot-operated presses, power press electric controls. Hot working safety in forging, hot rolling mill operation, safe guards in hot rolling mills. Safety in gas furnace operation.

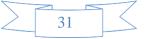
UNIT V SAFETY IN FINISHING, INSPECTION AND TESTING

Heat treatment operations, electro plating, sand and shot blasting, safety in inspection and testing, dynamic balancing, hydro testing. Health and welfare measures in engineering industry-pollution control in engineering industry-industrial waste disposal.

TOTAL: 30 PERIODS

REFERENCES

- 1. "Accident Prevention Manual" NSC, Chicago, 1982.
- 2. "Occupational safety Manual" BHEL, Trichy, 1988.
- 3. "Safety Management by John V. Grimaldi and Rollin H. Simonds, All India Travelers Book seller, New Delhi, 1989.
- 4. "Safety in Industry" N.V. Krishnan Jaico Publishery House, 1996.



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- 5. Indian Boiler acts and Regulations, Government of India.
- 6. Safety in the use of wood working machines, HMSO, UK 1992.
- 7. Health and Safety in welding and Allied processes, welding Institute, UK, High Tech. Publishing Ltd., London, 1989.

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18BSAU41 MATHEMATICS - IV (STATISTICS AND NUMERICAL METHODS)

- To revise the skill on testing of hypothesis
- To selectwith the design of experiment
- To examine the knowledge on solution of equations and eigenvalue problems
- To

use the applications of interpolation, numerical differentiation and numerical integration

• To identify the knowledge on numerical solution of ordinary differential equations.

UNITI TESTING OF HYPOTHESIS

Sampling distributions – Large samples-Tests for single mean, Proportion, Difference of means Small samples – Testsfor single mean, two mean and paired t-test-F-test – chi-square test for goodness of fit – Independence of attributes-DesignofExperiments-Completelyrandomizeddesign–Randomizedblockdesign–Latinsquaredesign.

UNITII CORRELATIONANDREGRESSIONANALYSIS

Introduction to Correlation Analysis- Karl Pearson's Coefficient of Correlation-Rank Correlation-Regression Analysis-Curvefitting-Introduction- method ofleastsquares.

UNITILI SOLUTION OF EQUATIONS

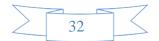
Introduction-Bisection method-Newton-Raphson's method- Regula falsi method- Gauss Elimination method -Gauss-Jordanmethods –MatrixInversion byGauss-Jordan method.

UNITIVINTERPOLATION,NUMERICALDIFFERENTIATIONANDNUMERICAL 12 INTEGRATION 12

Introduction–Newton'sforwardandbackwardinterpolation–Lagrange'sInterpolationformula-DerivativesusingNewton's forward and backward difference formula -Numerical integration using Trapezoidal ,Simpson's 1/3 rules andSimpson's3/8rules.

UNIT VNUMERICALSOLUTIONOF ORDINARYDIFFERENTIALEQUATIONS

Introduction-Taylor's series method -Euler's method - Modified Euler's method – Second and Fourth order Runge-Kuttamethod for solving first order equations-Milne's Predictor corrector method and Adams-Bashforth method (Simpleproblems).



TOTAL:60Hours

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TEXTBOOKS:

- 1. Grewal,B.S.andGrewal,J.S., "NumericalmethodsinEngineeringandScience",9thEdition,KhannaPublis hers,NewDelhi,2012.(Forunits3,4and5).
- 2. JohnsonR.A.andGuptaC.B, "MillerandFreund'sProbabilityandStatisticsforEngineers", PearsonEduca tion, Asia, 7thedition, 2007 (For units1and2).
- 3. Dr.Kandasamy .P, Dr.Thilagavathi, Dr.Gunavathi.K, "Statistics and numerical methods", s.chand and company, firstedition,2010.

REFERENCEBOOKS:

- 1. Chapra,S.CandCanale,R.P."NumericalMethodsforEngineers",TataMcGraw-Hill,New Delhi,7thEdition,2014.
- 2. WalpoleR.E,MyersR.H,MyersS.L,andYe.K,"ProbabilityandStatisticsforEngineersandScientists",Pear sonEducation,Asia , 9thedition,2011.

18P	CAU41	AUTOMOTIVE FUELS AND LUBRICANTS	L 3	Т 0	Р 0	С 3
Cou	rse Outcome: <mark>(Empl</mark> e	oyability)				
٠	To <mark>designthemanufa</mark>	<mark>cture</mark> of fuelsandlubricants				
•	To <mark>evaluate the theo</mark>	<mark>ry </mark> of lubrication				

- To classify the lubricants used in automobiles
- To use the properties andtestingoffuels
- To explain the combustion&fuelrating
 - •

UNITI MANUFACTUREOF FUELSANDLUBRICANTS

Structureofpetroleum,refiningprocess,fuels,thermalcracking,catalyticcracking,polymerization,alkylati on,isomerisation, blending, products of refining process. Manufacture of lubricating oil base stocks, manufacture of finishedautomotivelubricants.

UNITIITHEORY OF LUBRICATION

Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, elastohydrodynamic lubrication, boundary lubrication, bearing lubrication, functions of the lubrication system, introduction todesignofalubricatingsystem.

UNITIIILUBRICANTS

Specific requirements for automotive lubricants, oxidation deterioration and degradation of

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SI Engines – flame propagation and mechanism of combustion, normal combustion, knocking, octane

fuelrequirements.CIEngine,mechanismofcombustion,dieselknock,cetanerating,fuelrequirements.Addi tive-mechanism, requirements of an additive, petrol fuel additives and dieselfuel additives specificationsoffuels.

TEXTBOOKS:

rating,

- 1. Ganesan.V., "InternalCombustionEngineering", TataMcGraw-HillPublishingCo., NewDelhi, 2003.
- Mathur.M.L.,Sharma.R.P."Acourseininternalcombustionengines",Dhanpatraipublication,2003. 2.
- Obert.E.F"InternalCombustion Engineering and Air Pollution", International book Co., 1988. 3.

REFERENCES:

- 1. Brame, J.S.S. and King, J.G. "Fuels Solids, Liquids, Gaseous". Edward Arnold, 1961
- 2. Francis, W, "Fuelsand Fuel Technology", Vol. I & II, Pergamon, 1965
- 3. Hobson, G.D. & Pohl. W"Modern Petroleum Technology", 1974
- 4. Lansdown. A.R., Lubrication, "Apractical guidetolubricant selection", Pergamon press, 1982.
- 5. Raymond.C.Gunther,"Lubrication",ChiltonBookCo., 1971.

lubricants,

andadditivemechanism, syntheticlubricants, classification of lubricatingoils, properties of lubricatingoils, testsonlubricants.Grease, classification, properties, test usedingrease.

UNITIVPROPERTIES AND TESTING OFFUELS

offuels, relative Thermo-chemistryoffuels, properties and testing density, calorific value, flashpoint, firepoint, distillation, vapour pressure, spontaneous ignition flammability, ignitability, dieselindex,API temperature, viscosity, pour point, gravity,anilinepoint,carbon residue, copperstrip corrosion etc.

UNITVCOMBUSTION&FUELRATING

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additives

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TOTAL: 45PERIODS

18P0	CAU42 ENGINEERINGMETALLURGY	L	Т	Р	С
		3	0	0	3
COU	RSE OUTCOME: <mark>(Employability)</mark>				
٠	To <mark>invent alloys</mark> andphasediagram,Iron-Ironcarbidediagramandstee	elclas	sificati	on.	
•	To select the isothermal transformation, continuous cooling dia	gram	s and	different	
	heat treatment processes.				
•	To <mark>classify the mechanism o</mark> f plastic deformation and testing				
	mechanical properties.				
•	To <mark>usetheeffectofalloying</mark> elementsonferrousandnon-ferrousmetals				
•	To explain the Differentiate differentnon-metallicmaterials.				

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UNITI ALLOYSANDPHASEDIAGRAMS

Constitutionofalloys-Solidsolutions, substitutional and interstitial-

phasediagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron - carbon equilibrium diagram. Classification of steel and cast Ironmicrostructure, properties and application.

UNITII HEAT TREATMENT

Definition – Full annealing, stress relief, recrystallisation and spheroidising – normalising, hardening Temperingofsteel.Isothermaltransformationdiagrams-coolingcurvessuperimposedon and I.T. CCR Hardenability, Jominyendquenchtest-Austempering, martemperingdiagram casehardening,carburizing,Nitriding,cyaniding,carbonitriding–Flame andInduction hardening-Vacuum and Plasmahardening.

UNITIIIFERROUS ANDNON-FERROUSMETALS

 $Effect of alloying additions on steel-\alpha and \beta stabilisers-stainless and tool steels-HSLA, Maraging steels-$ CastIron-Grey, white, malleable, spheroidal – alloy cast irons, Copper and copper alloys. Brass, Bronze and Cupronickel –Aluminium and Al-Cu – precipitation strengthening treatment – Bearing alloys, Mgalloys, Ni-based super alloys and Titanium alloys.

UNITIVNON-METALLICMATERIALS

Polymers-typesofpolymer,commodityandengineeringpolymers-

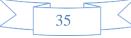
Propertiesandapplicationsofvariousthermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers-UreaandPhenol formaldehydes)-EngineeringCeramics

Properties and applicationsof Al2O3, SiC, Si3N4, PSZ and SIALON -Composites-Classifications- Metal Matrix and FRP- Applications of Composites.

UNITVMECHANICAL PROPERTIESANDDEFORMATIONMECHANISMS

Mechanismsofplasticdeformation, slipandtwinning-Typesof

fracture-Testingof



materialsundertension,compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod andcharpy,fatigue andcreep failuremechanisms.

TOTAL:45PERIODS

TEXTBOOKS:

- 1. Avner, S.H., "Introduction to Physical Metallurgy", McGraw Hill Book Company, 1997.
- 2. WilliamsDCallister, "MaterialScienceandEngineering" WileyIndiaPvtLtd, RevisedIndianEdition2014

REFERENCES:

- 1. KennethG.BudinskiandMichaelK.Budinski, "EngineeringMaterials", PrenticeHallofIndiaPrivateLimited , 2010.
- 2. Raghavan.V, "MaterialsScienceandEngineering", PrenticeHallofIndiaPvt.Ltd., 2015.
- 3. U.C.Jindal:MaterialScienceandMetallurgy,"EngineeringMaterialsandMetallurgy",FirstEdition,DorlingKindersley,2012
- 4. Upadhyay.G.S.andAnishUpadhyay,"MaterialsScienceandEngineering",VivaBooksPvt.Ltd.,NewDelhi ,2006.

18PCAU43	AUTOMOTIVECHASSIS	L	Т	Р	С
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Course Outcome: (Employability)

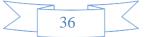
- To develop the vehicle layout and drives.
- To defend thesteering<mark>system</mark>anditscomponents.
- To classify the driveline system components and its working.
- To implement the concept of various types of braking system and its components.
- To explain the suspension systems and its components.

UNITI LAYOUT, FRAME, FRONT AXLEANDSTEERINGSYSTEM

Basic construction of chassis, Types of Chassis layout, with reference to Power Plant location and drive, various, typesof frames, Loads acting on vehicle frame, Types of Front Axles and Stub Axles, Front Wheel Geometry. Condition forTrue Rolling Motion. Ackerman's and Davi's Steering Mechanisms, Steering Linkages, Different Types of Steering Gearboxes,SlipAngle, Over-SteerandUnder-Steer,ReversibleandIrreversible Steering,Power Steering.

UNITII DRIVELINE, FINALDRIVEANDDIFFERENTIAL

Driving Thrust and its effects, torque reactions and side thrust, Hotchkiss drive, torque tube drive, radius rods and stabilizers, Propeller Shaft, Universal Joints, Constant Velocity Universal Joints, Final drive, different types of final drive, Worm and Worm wheel, straight bevel gear, spiral bevel gear and hypoid gear final drive. Differential principle.Constructionaldetailsofdifferentialunit,Differentialhousings,Non–Slipdifferential,Differentiallocks.



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UNITIII REARAXLES, WHEELS, RIMSANDTYRES

Construction of rear axles, Types of Loads acting on rear axles, Full –Floating, Three–Quarter FloatingandSemi–FloatingAxles,Twistbeamrearaxle,Types,Multiaxlesvehicles.WheelsandRims,TypesofTyresandtheirconstructionaldetails.axlesvehicles.

UNITIV BRAKESYSTEMS

Need for Brake systems, Stopping Distance, Time and Braking Efficiency, Effect of Weight Transfer during Braking, Classification of brakes, Braking Torque, drum brake and disc Brake Theory, Types and Construction of HydraulicBraking System, Mechanical Braking System, Pneumatic Braking System, Power–Assisted Braking System, ServoBrakes, Retarders–antilockbrakingsystems(ABS).

UNITV SUSPENSION SYSTEM

Requirement of Suspension System, Types of Suspension Springs, Constructional details and characteristics of SingleLeaf, Multi–Leaf spring, Coil and Torsion bar Springs, Rubber, Pneumatic and Hydro – elastic Suspension SpringSystems, Independent SuspensionSystem, Shock Absorbers, Types and Constructional details of Leaf and CoilSprings.

TOTAL:45Hours

TEXTBOOKS:

- K.Newton,W.SteedsandT.K.Garret, "TheMotorVehicle", 13thEdition, ButterworthHeinemann, India, 200
 4.
- 2. P.M.Heldt, "AutomotiveChassis", ChiltonCo., NewYork, 1982.
- 3. W.Steed, "MechanicsofRoadVehicles", IlliffeBooksLtd., London. 1992.

REFERENCES:

- 1. HarbanSinghRayat, "TheAutomobile", S.Chand&Co.Ltd, NewDelhi, 2000.
- 2. G.J.Giles, "SteeringSuspensionandTyres", IlliffeBooksLtd., London, 1975.
- 3. KirpalSingh, "AutomobileEngineering", Standardpublishers, Distributors, Delhi, 1999.
- 4. G.B.S.Narang, "AutomobileEngineering", KhannaPublishers, TwelfthreprintNewDelhi, 2005.
- 5. R.P.Sharma, "AutomobileEngineering", DhanpatRai&Sons, NewDelhi, 2000.

18PCAU44	HEATAND MASSTRANSFER	L	Т	Р	С
		3	1	0	4

Course Outcome<mark>: (Employability)</mark>

- Todevelopthethermalanalysisandsizingofheatexchangersandtounderstandthebasic
- Tojustify theconcepts of heattransfer through extended surfaces.
- Toclassifythemechanisms of heattransfer understeady and transient conditions.concepts of mass transfer.
- To complete the designandanalyze the performance of heatexchangers
- To explainthephysicalphenomena associated with convection.

(UseofstandardHMTdatabookpermitted)

UNITI CONDUCTION

Basic Concepts – Mechanism of Heat Transfer – Conduction, Convection and Radiation – General Differential equationof Heat Conduction – Fourier Law of Conduction – Cartesian and Cylindrical



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Coordinates – One Dimensional SteadyState Heat Conduction – Conduction through Plane Wall, Cylinders and Spherical systems – Composite Systems –Conduction with Internal Heat Generation – Extended Surfaces – Unsteady Heat Conduction – Lumped Analysis – UseofHeislersChart.

UNITIICONVECTION

Basic Concepts – Convective Heat Transfer Coefficients – Boundary Layer Concept – Types of Convection – ForcedConvection – Dimensional Analysis – External Flow – Flow over Plates, Cylinders and Spheres – Internal Flow – Laminar and Turbulent Flow – Combined Laminar and Turbulent – Flow over Bank of tubes – Free Convection –DimensionalAnalysis–FlowoverVerticalPlate, HorizontalPlate,InclinedPlate,CylindersandSpheres.

UNITIII PHASECHANGEHEATTRANSFERANDHEATEXCHANGERS

Nusselts theory of condensation-pool boiling, flow boiling, correlations in boiling and condensation. Types of HeatExchangers – LMTD Method of heat Exchanger Analysis – Effectiveness – NTU method of Heat Exchanger Analysis –OverallHeatTransfer Coefficient–Fouling Factors.

UNITIV RADIATION

Basic Concepts, Laws of Radiation – Stefan Boltzman Law, Kirchoff Law –Black Body Radiation –Grey body radiationShapeFactorAlgebra –Electrical Analogy–RadiationShields–IntroductiontoGas Radiation.

UNITV MASS TRANSFER

Basic Concepts – Diffusion Mass Transfer – Fick's Law of Diffusion – Steady state Molecular Diffusion – ConvectiveMassTransfer–Momentum, HeatandMass TransferAnalogy–ConvectiveMassTransfer Correlations

TOTAL:60Hours

TEXTBOOKS:

- 1. SachdevaRC, "FundamentalsofEngineeringHeatandMassTransfer"NewAgeInternational, 1995.
- 2. YadavR"HeatandMassTransfer"CentralPublishingHouse,1995.

REFERENCES:

- 1. NagP.K, "HeatTransfer", TataMcGraw-Hill, NewDelhi, 2002
- 2. HolmanJ.P"HeatandMassTransfer"TataMcGraw-Hill,2000.
- 3. KothandaramanC.P"FundamentalsofHeatandMassTransfer"NewAgeInternational,NewDelhi,1998
- FrankP.IncroperaandDavidP.DeWitt, "FundamentalsofHeatandMassTransfer", JohnWileyandSons, 199
 8.
- 5. VelrajR, "Heat&MassTransfer", AneBooks, NewDelhi, 2004

18MCAU41	ENVIRONMENTAL SCIENCE ANDENGINEERING	L	Т	Р	С
		3	0	0	3

Course Outcome: (Employability)

• To build the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being inmaintainingaclean environmentanduseful environment for the future.

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- To justify the environmental pollution.
- To classify the natural resources.
- To solve the social<mark>issues</mark> and the environment.
- To review the human population and the environment

UNITI ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 9

Definition – Scope and importance – Need for public awareness – Concepts of an Ecosystem – Structure and FunctionofanEcosystem–Producers,ConsumersandDecomposers– EnergyFlowintheEcosystem–EcologicalSuccession - Food Chains, Food Webs and Ecological Pyramids – Introduction, Types, Characteristic Features, Structure and Function of the (A) Forest Ecosystem (B) Grassland Ecosystem (C) Desert Ecosystem (D) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries) – Introduction to Biodiversity – Definition: Genetic, Species and Ecosystem Diversity – Bio-geographical Classification of India – Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values – Biodiversity at Global, National and Local Levels – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ conservation of Biodiversity.Field Study of Common Plants, Insects and Birds.Fieldstudyofsimpleecosystems-pond,river,hillslopes,etc.

UNITII ENVIRONMENTAL POLLUTION

Definition – Causes, Effects and Control Measures of (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) MarinePollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Solid Waste Management:- Causes, Effectsand Control Measures of municipal solid Wastes – Role of an Individual in Prevention of Pollution – Pollution CaseStudies – disaster Management - Floods, Earthquake, Cycloneand Landslides. Field study of local polluted site –Urban/ Rural/ Industrial / Agricultural.

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UNITIII

NATURALRESOURCES

Forest resources -Use and over – Exploitation – Deforestation – Case studies – Timber extraction – Mining – Dams andtheirgroundwater–Floods–Drought–Conflictsoverwater–Dams– BenefitsandProblems–MineralResources-

Use and Exploitation, Environmental Effects of Extracting and Using Mineral Resources, Case Studies-Interview Content of Content o

FoodResources: World Food Problems, Changes caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer- Pesticide Problems, Water Logging, salinity, Case Studies – Energy Resources:- Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources, Case Studies – Land Resources - Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of anIndividualinConservationofNaturalResources- EquitableuseofResourcesforSustainableLifestyles.

Field study of local area to document environmental assets-river/forest/grassland/hill/mountain.

UNITIV SOCIALISSUES AND THE ENVIRONMENT

From Unsustainable To Sustainable Development – Urban Problems Related to energy – Water conservation, RainWater Harvesting, Watershed Management – Resettlement and Rehabilitation of People, its Problems and Concerns,Case Studies Role of non – governmental organization -Environmental Ethics- Issues and Possible Solutions – ClimateChange, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust, Case Studies –Wasteland Reclamation – Consumerism and Waste Products – Environment Production Act – Air (Prevention andControlofPollution)Act–Water(PreventionandControlofPollution)Act–WildlifeProtectionAct– ForestConservation Act –enforcement machinery involved in environmental Legislation – Central and state pollution controlboards-Public Awareness.

UNITV HUMANPOPULATION AND THE ENVIRONMENT

Population Growth, Variation among Nations – Population Explosion Family Welfare Programme – environment andHuman Health – Human Rights –Value Education – HIV /AIDS – Women and Child Welfare – Role of InformationTechnologyinEnvironment andHumanHealth– CaseStudies.

Total:45Hours

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TEXTBOOKS:

- 1. GilbertM.Masters, 'IntroductiontoEnvironmentalEngineeringandScience',2ndedition,PearsonEducation(2004).
- 2. BennyJoseph, 'EnvironmentalScienceand Engineering', TataMcGraw-Hill, NewDelhi, (2006).

REFERENCES:

- 1. R.K.Trivedi, 'HandbookofEnvironmentalLaws,Rules,Guidelines,CompliancesandStandards',Vol.Ian dII,Enviro Media.
- 2. Cunningham,W.P.Cooper,T.H.Gorhani, 'EnvironmentalEncyclopedia', JaicoPubl., House, Mumbai, 2001.
- 3. DharmendraS.Sengar, 'Environmentallaw', PrenticehallofIndiaPVTLTD, NewDelhi, 2007.
- 4. Rajagopalan, R, 'Environmental Studies-From Crisisto Cure', Oxford University Press (2005).

18PCAU45 AUTOMOTIVE CHASSIS COMPONENTS LAB

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COURSE OUTCOME [SKILL DEVELOPMENT]

To Apply the Heavy duty vehicle frame To Analyze the Light duty Vehicle

To Examine the dismantling and assembling of Front Axle, Rear Axle and Differential

To Organize the Steering systems along with any two types of steering gear box

LIST OF EXPERIMENTS

Study and measurement of the following chassis frames:

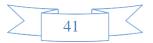
1. Heavy duty vehicle frame (Leyland, Tata etc)

- 2. Light duty vehicle frame (Ambassador, Maruti van etc)
- Front Axle
- 4. Rear Axle
- 5. Differential
- 6. Steering systems along with any two types of steering gear box
- 7. Braking systems hydraulic servo vacuum, compressed air power brakes.
- 8. Leaf spring, coil spring, torsion bar spring, Hydraulic shock absorber
- 9. Clutch assembly of different types
- 10. Gear Box
- 11. Transfer case

THE LIST OF EQUIPMENTS - Each 1 No (For A Batch of 30 Students)

- 1. Heavy duty vehicle chassis frame (Leyland or Tata)
- 2. Light duty vehicle chassis frame
- 3. Front axle
- 4. Rear axle
- 5. Steering system
- 2. Steering gear box (Rack and pinion, recirculating Ball type)
- 3. Hydraulic brake system
- 4. Air brake system
- 5. Leaf spring, coil spring, torsion bar
- 6. Hydraulic shock absorber
- 7. Diaphragm clutch assembly
- 8. Gear box (light duty, heavy duty)
- 9. Transfer case

TOTAL: 45 Hours



COURSE OUTCOME: [SKILL DEVELOPMENT]

To Demonstrate the Dismantling and Assembling of 4 cylinder petrol engine.

To Apply the oil filter, fuel filter, fuel injection system, carburetor, MPFI

To Evaluate the ignition system components - coil, magneto and electronic ignition systems.

To Evaluate the Ovality and taper measurement of cylinder bore.

LIST OF EXPERIMENTS

1. Dismantling of 4 cylinder petrol engine.

2. Assembling of 4 cylinder petrol engine.

- 3. Dismantling of 6 cylinder diesel engine.
- 4. Assembling of 6 cylinder diesel engine.
- 5. Study of oil filter, fuel filter, fuel injection system, carburetor, MPFI
- 6. Study of ignition system components coil, magneto and electronic ignition systems.
- 7. Study of engine cooling system components
- 8. Study of engine lubrication system components
- 9. Ovality and taper measurement of cylinder bore and comparison with standard specifications
- 10. Ovality and taper measurement of engine crank shaft and comparison with standard specification

LIST OF EQUIPMENTS - Each 1 No

- 1. Four cylinder petrol engine
- 2. Six cylinder diesel engine
- 3. Fuel filter, fuel injection pump, injector, carburetor, MPFI component
- 4. Ignition coil, magneto, electronic ignition system components
- 5. Water pump, thermostat, radiator, temperature gauge
- 6. Lub oil pump, pressure relief valve, filter, oil pressure gauge
- 7. Internal micrometer, external micrometer, dial gauges.

TOTAL: 45 Hours

18BESY41

BASIC LIFE SKILLS

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COURSE OBJECTIVE:[SKILL DEVELOPMENT]

To Analyze the physical health

To Examine the life force

To apply the mental health To Organize the human values and morality



UNIT I: PHYSICAL HEALTH

 Manavalakalai (SKY) Yoga: Introduction - Education as a means for youth empowerment - Greatness of Education -Yoga for youth Empowerment.

2. Simplified Physical Exercises: Hand, Leg, Breathing, Eye exercises - Kapalabathi, Makarasana Part I, Makarasana Part II, Body Massage, Acu pressure, Relaxation exercises - Benefits.

3. Yogasanas: Pranamasana - Hastha Uttanasana - Pada Hasthasana – AswaSanjalana Asana - Thuvipatha asva Sanjalana asana - Astanga Namaskara - Bhujangasana - Atha Muktha Savasana - Aswa Sanjalana Asana - Pada Hasthasana - Hastha Uttanasana - Pranamasana.

4. Pranayama : Naddi suddi - Clearance Practice - Benefits.

UNIT II: LIFE FORCE

 Reasons for Diseases - Natural reasons (Genetic / imprints, Planetary Position, Natural calamities and climatic changes) - Unnatural reasons (Food habits, Thoughts, Deeds)

2. Philosophy of Kaya kalpa - Physical body - Sexual vital fluid - Life force - Bio-Magnetism - Mind.

3. Maintaining youthfulness : Postponing old age - Transformation of food into seven components - Importance of sexual vital fluid.

4. Measure and method in five aspects of life - Controlling undue Passion.

5. Kayakalpa practice - Aswini Mudra - Ojas breath - Benefits of Kaya Kalpa.

UNIT III: MENTAL HEALTH

1) Mental Frequencies - Beta, Apha, Theta and Delta wave - Agna Meditation explanation - benefits.

2) Shanthi Meditation explanation - Benefits

3) Thuriya Meditation explanation - Benefits

4) Benefits of Blessing - Self blessing (Auto suggestion) - Family blessing - Blessing the others - World blessing - Divine protection

UNIT IV:

Human Values:

1) Self control - Self confidence - Honesty

2) Contentment - Humility - Modesty

3) Tolerance - Adjustment - Sacrifice - Forgiveness

VALUES

4) Purity (Body, Dress, Environment) - Physical purity - Mental purity - Spiritual purity

· Social Values:

1) Non violence - Service

- 2) Patriotism Equality
- 3) Respect for parents and elders care and protection Respect for teacher

4) Punctuality - Time Management

UNIT V: MORALITY (VIRTUES)

1) Importance of Introspection - I - Mine (Ego, Possessiveness).

2) Six Evil Temperaments - Greed - Anger - Miserliness - Immoral sexual passion - Inferiority and superiority Complex - Vengeance.

3) Maneuvering of Six Temperaments - Contentment - Tolerance - Charity - Chastity - Equality - Pardon (Forgiveness).

4) Five essential Qualities acquired through Meditation: Perspicacity - Magnanimity - Receptivity - Adaptability - Creativity.

5) Improved Memory Power - Success in the Examination.

Total: 30 hrs.

REFERENCE BOOKS:



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- 1. Vethathiri Maharishi, 16th Edi.2013, Yoga for Modern Age, Vethathiri Publications, Erode.
- 2. Vethathiri Maharishi, 2014, Simplified Physical Exercises, Vethathiri Publications, Erode.
- 3. Vethathiri Maharishi, 3rd Edi.2014, Kayakalpam, Vethathiri Publications, Erode.
- 4. Rev.Dr.G.U.pope, 2016, Thirukkural, Giri Trading Agency,
- 5. Vethathiri Maharishi, 1994, Mind, Vethathiri Publications, Erode.
- 6. Chandrasekaran.K, 1999, Sound Health through yoga, Sedapati, Tamilnadu, Premkalyan Publications.
- 7. Iyengar, B.K.S. 2008, Light on Yoga, Noida, UP India, Harber Collins Publishing India Ltd.,



18PCAU51	AUTOMOTIVETRANSMISSION	L	Т	Р	С
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Course Outcome: (Employability)

- To implement knowledge in automotive transmission concept, construction and principle of operation of various types of mechanical transmission components, hydrodynamic devices, hydrostatic devisees and automatic transmission system will be taught to the students.
- To assess the concept of gear motions, drive line

positions.

- To classify the different typesofgearboxes.
- To apply the multi stage and polyphase torque converters, performance characteristicsCO-4:Study aboutAutomatic transmission.

• To **Explaintheworkingof**

variouspartslikeengine,transmission,clutch,brakes

UNITI **CLUTCHANDGEAR BOX**

Requirement of Transmission system.Different types of clutches: Principle, construction and operation of frictionclutches.Objective of the gear box. Problems on performance of automobile such as Resistance to motion, Tractiveeffort, Engine speed & power and acceleration. Determination of gear box ratios for different vehicle applications.Differenttypes ofgearboxes.

UNITII **HYDRODYNAMICDRIVES**

Principles, performance and limitations of fluid coupling Constructional details of a typical fluid coupling. Reduction ofdrag torque, Principle, construction and advantages of hydrodynamic torque converters. Performance characteristics, converter couplings. Multi-stage Torque converter andpolyphasetorque converter.

UNITIII **AUTOMATICTRANSMISSION**

Automatic transmission: relative merits and demerits when compared to conventional transmission, ofgears, study of typical automatic transmissions, Ford — Tautomatic control modelgearbox,Wilsongearbox,Electro-magnetictransmission,Automatic overdrive,Hydrauliccontrol systemfor automatictransmission.

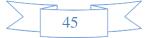
HYDROSTATICDRIVEANDELECTRIC DRIVE UNITIV

Principle of hydrostatic drive systems. Construction and working of typical drives. Advantages and Control limitations.

ofhydrostatictransmissions, Principle of electric drive. Early and modified Ward Leonard control systems.

UNITV AUTOMATICTRANSMISSIONAPPLICATIONS

Chevrolet ``Turboglide'' transmission. Toyota's Automatic transmission with Electronic control system, Automatic transmission and the system of the system



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omatic Transmission with Intelligent Electronic controls system, Hydraulic Actuation system. Continuously the system of the sy

VariableTransmission (CVT) – types – Operations.

TOTAL:45Hours

TEXTBOOK:

- 1. HeldtP.M,TorqueConverters,ChiltonBookCo.,1992.
- 2. K.Newton,W.SteedsandT.K.Garret, "TheMotorVehicle",13thEdition,ButterworthHeinemann,India, 2004.

REFERENCES:

- 1. HaraldNaunheimer,BerndBertsche,JoachimRyborz,WolfgangNovak,"AutomotiveTransmission s:Fundamentals,Selection, DesignandApplication",2nded.,Springer,2011.
- HeinzHeisler, "AdvancedVehicleTechnology", secondedition, Butterworth– Heinemann, NewYork, 2002
- 3. Dr.N.K.Giri, "AutomobileMechanics", Seventhreprint, KhannaPublishers, Delhi, 2005.



Course Outcome: (Employability)

- Todesignconceptandprinciples of various engine components. These concepts and principles are far • miliarized for designof components.
- To select the interference fits & surface finish. ٠
- To compare the Rankine'sformula, Tetmajer'sformula&Johnsonformula. •
- To apply the conceptsofcylinder and piston design. •
- To explain the frontandrear-enddetails.

UNITI INTRODUCTION

Engineering materials - Introduction endurance limit, notch sensitivity. Tolerances, types of tolerances and fits, designconsiderations for interference fits, surface finish, surface roughness, Rankine's formula - Tetmajer's formula - Johnsonformula-designofpush- rods.

UNITII DESIGNOF CYLINDER, PISTONAND CONNECTING ROD

Choiceofmaterialforcylinderandpiston, design of cylinder, piston, piston pin, piston rings, piston failures, lu brication of piston assembly. Material for connectingrod, determining minimumlength of connecting rod, smallend design, shankdesign, design of bigend capbolts.

UNITIII DESIGNOF CRANKSHAFT

Balancing of I.C. engines, significance of firing order. Material for crankshaft, design of crankshaft under bending andtwisting,balancingweightcalculations,developmentofshortandlongcrankarms.Frontandrear-

enddetails.

UNITIV DESIGNOF FLYWHEELS

Determination of the mass of a flywheel for a given co- efficient of speed fluctuation. Engine flywheel stresses on therimoftheflywheels. Design of hubsandarmsofthe flywheel, turning moment diagram.

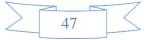
UNITV DESIGNOF VALVES ANDVALVE TRAIN

Design aspects of intake & exhaust manifolds, inlet & exhaust valves, valve springs, tappets and valve train. Design of cam& camshafst. Design of rocker arm. Camprofile generation.

TOTAL:45Hours

TEXTBOOK:

1.Khurmi.R.S.&Gupta.J.K.,AtextbookofMachineDesign,EurasiaPublishingHouse(Pvt)Ltd,2001.



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REFERENCES:

- 1. Jain.R.K, "MachineDesign", KhannaPublishers, NewDelhi, 2005.
- 2. Giri.N.K,AutomobileMechanics,KhannaPublishers,NewDelhi,2007.



Course Objective: (Skill Development)

- To develop the designing the vehicle and various resistances.
- To review the vehicle and engine performance curves.
- To solve the calculation of vehicle gear ratios.
- To apply the concepts and assumptions to be made in designing a vehicle.
- To explain the various resistances to vehicle motion and plot the graphs.

UNIT I INTRODUCTION

Assumptions to be made in designing a vehicle, Range of values for Gross Vehicle Weight, Frontal Area, maximum speed, maximum acceleration, grad ability of vehicle in different gears, Basics of Automobile Design.

UNIT II RESISTANCE TO VECHICLE MOTION

Calculation, Tabulation and Plotting of Curves for Air and Rolling Resistances at various vehicle speeds, Calculation and Plotting of Driving force, Power requirement for different loads and acceleration, Maximum Power calculation.

UNIT III PERFORMANCE CURVES-I

Calculation, Tabulation and Plotting of Torque and Mechanical Efficiency for different vehicle speeds, Interpolation of Pressure – Volume diagram, Calculation of frictional Mean Effective Pressure, Calculation of Engine Cubic Capacity, Bore and Stroke Length.

UNIT IV PERFORMANCE CURVES-II

Connecting rod length to Crank Radius Ratio, Plotting of Piston Velocity and Acceleration against Crank Angle, Plotting Gas force, inertia force and Resultant force against Crank Angle, Turning Moment and Side Thrust against Crank Angle.

UNIT V GEAR RATIOS



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Determination of Gear Ratios for first, second, third and top gears, Acceleration and Grad ability vehicle, Typical problems occur on Vehicle performance.

TOTAL: 60 Hours

TEXT BOOKS:

1 N. K. Giri, Automotive Mechanics, Khanna Publishers, New Delhi, 2005.

2. Heldt, P.M., High Speed Combustion Engines, Oxfore and I.B.H. Publishing Co., Kolkata, 2002.

REFERENCES:

1. Heinz Heisler, Advanced Vehicle Technology, Butterworth-Heinemann Ltd; 2nd Revised edition edition. 2002.

2. R.B.Gupta, Automobile Engineering, Satya Prakashan, New Delhi, 2012.

TOTAL:45Hours



To implementknowledgein automotivepollution control techniques ofpollutants like UBHC, CO,

- То • theemission and its effect on hum an heal than den viron ment
- To solve the formation of pollutantin Slengine.
- To explainthevariousnoise and noise reduction in automobile.

EMISSION FROM AUTOMOBILES UNITI

Vehiclepopulationassessmentinmetropolitancitiesand

contributiontopollution, effects on human health and environment, globalwarming, various emissionsfrom Automobiles— Formation, transient operational effects onpollution.

UNITII **EMISSIONS FROM SPARKIGNITION ENGINE ANDITS CONTROL**

Emission formation in SI Engines- Carbon monoxide- Unburned hydrocarbon Nitric oxide. Lead particulate—Poly-nuclear Aromatic hydrocarbon emissions—Effects of design and operating controllingofpollutantsfromEngine-Thermalreacts variables on emission formation-Catalyticconverters—CharcoalCanisterControlforevaporativeemission PositiveCrankcaseventilationsystemforUBHCemissionreduction.

UNITIII **EMISSIONFROM COMPRESSIONIGNITION ENGINEANDITSCONTROL**

Physical and Chemical delay — Significance — Intermediate Compounds Formation — emission formation due to incomplete Combustion — Effect of Operating variables on Emission formation — White, Blue, and Black Smokes. Nitric Oxide and Particulate controlling of Emission — Operating Behavior- Fumigation EGR- Air Injection — CetaneumberEffect.

UNIT-IV NOISEPOLLUTION FROM AUTOMOBILES

Causes for Noise from Automobiles—Traffic Noise—Engine Noise—Transmission Noise—vehicle structural Noise, Exhaust Noise, Noise reduction in Automobiles — Encapsulation technique for noise reduction — Silencer Design on Soundreduction inautomobiles.

UNIT-V **TEST PROCEDURES ANDEMISSION MEASUREMENTS**

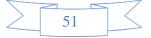
Constant Volume Sampling I and 3 (CVSI &CVS3) Systems- Sampling Procedures — Seven mode and thirteen modecycles for Emission Sampling — Sampling problems — Quantifying Emissions — Measurement of CO, CO by NDIR.Hydrocarbon emission by FID- Chemiluminesecent detector for Measurement of NOR— Smoke meters — DilutionTunnelTechnique for particulateMeasurement-Sound levelmeters.

TOTAL:45Hours

TEXTBOOKS:

- 1. G.P.SpringerandD.J.Patterson, Engine Emissions, Pollutant formation, Plenum Press, New York, 1986.
- 'EmissionfromCombustion 2. D.J.PattersonandN.A.Henin,

Engineandtheircontrol', AnnaArborSciencePublication, 1985.



18PCAU54 AUTOMOTIVEPOLLUTIONANDCONTROL

Course Outcome: (Employability)

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REFERENCES:

- 1. V.Ganesan, 'InternalcombustionEngines', TataMcGrawHillBookCo, EighthReprint, 2005.
- 2. CrouseandAnglin, 'AutomotiveEmissionControl',McGrawHillcompany.,Newyork1993.
- 3. L.Lberanek, 'NoiseReduction', McgrawhillCompany., Newyork 1993.
- 4. C.Duerson, 'NoiseAbatment', Butterworthsltd., London1990.

18PEAU12	ADVANCEDTHEORYOFI.C.ENGINES	L	Т	Р	С
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Course Outcome: (Employability)

- To design the various cycles with actual cycles.
- To select thecombustionreactions and stoichiometry.
- To compare the premixed and diffusion combustion in SI and CI engines.
- To implement the concepts of enginesimulation governing equations.
- To describesimulationofvariousengineprocesses for Sland Clengines.

UNITI CYCLEANALYSIS

Otto, Diesel, Dual, Stirling and Brayton cycles, comparison of air standard, fuel air and actual cycles, simple problemsonthe abovetopics.

UNITII COMBUSTION

Combustionreactions and stoichiometry, heat of reaction, adiabatic flame temperature in constant pressure and constant volume systems, fuels for internal combustion engines and their properties, premixed and diffusion combustion as applicable to SI and CI engines, concepts of burning rate and flame velocity, fuel spray characteristics and combustion indies elengines.

UNITILI COMBUSTIONMODELLING9Basicconceptsofenginesimulation,governingequations,simulationprocessesforSIandsimulationsimulation

Clengines.Adiabaticflametemperature,Heatreleasecalculations.ThermodynamicandFluidmechanicbas edmodels.

UNITIV ADVANCESIN IC ENGINES

LHR engines, surface ignition concept and multi fuel engines, stratified charge and lean burn engines, performance andemissioncharacteristics, merits and demerits.

UNITV ELECTRONIC ENGINE MANAGEMENT



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ComputercontrolofSI&CIenginesforbetterperformanceandlowemissions,closedloopcontrolofenginepa rametersoffuel injectionandignition

TOTAL:45Hours

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TEXTBOOKS:

- 1. Ganesan.V-"ICEngines" -Tata McGraw-Hill,2003.
- 2. JohnB.Haywood, "InternalCombustionEngineFundamentals", McGraw-HillAutomotiveTechnologySeriesISBN0-07-1000499-8, 1988.

REFERENCES:

- 1. Ganesan.V-'ComputerSimulationofSparkIgnitionProcesses' UniversitiesProcessLtd,Hyderabad-1993.
- 2. Ganesan.V.- ComputerSimulationofcompressionignitionengines-OrcentLongman-2000.
- 3. RichardStone- "IntroductiontoICEngines"-2ndedition-Macmilan-1992.

18GEAU01PRINCIPLESOF MANAGEMENTAND PROFESSIONALETHICSLTPC3003

Course Outcome: (Employability)

- To develop the studentsto study theevolution of Management, to study the functions and principles of management and to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyal ty and to appreciate the rights of others.
- To rate the management, managersrole and management challenges
- To distinguish planning, organizing, decision making, delegation, staffing and recruitment
- To computedirectingandcontrolling functions
- To Explain the engineering ethics and human values

UNITI OVERVIEW OF MANAGEMENT

Definition - Management - Role of managers - Evolution of Management thought – Organization and the environmental factors–Trends and Challenges of Management in Global Scenario.

UNITII PLANNING & ORGANIZING

Nature and purpose of planning and Organizing - Planning process - Types of plans – Managing by objective (MBO)Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - RationalDecision Making Process - Decision Making under different conditions. - Organization structure - Formal and informalgroups Iorganization - LineandStaffauthority-Departmentation- Spanofcontrol-CentralizationandDecentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training -Performance Appraisal.

UNITIII DIRECTING&CONTROLLING

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles -Leadership theories -Communication-Barrierstoeffectivecommunication-OrganizationCulture-Elementsandtypesofculture-Managingculturaldiversity.Processofcontrolling-Typesofcontrol-Budgetaryandnon-budgetarycontroltechniques



-ManagingProductivity-CostControl-PurchaseControl-MaintenanceControl-QualityControl-Planningoperations.

UNITIV ENGINEERING ETHICS&HUMANVALUES

Definition - Societies for engineers – Code of Ethics – Ethical Issues involved in cross border research - Ethical andUnethical practices – case studies – situational decision making - Morals, values and Ethics – Integrity – Work ethic –Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage –Valuingtime – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction toYogaandmeditation forprofessionalexcellenceandstress management.

UNITV SAFETYRESPONSIBILITIESANDRIGHTS

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority –Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – EmployeeRights–IntellectualPropertyRights(IPR)–Discrimination–Globalissues-MultinationalCorporations–Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers –EngineersasExpertWitnessesandAdvisors– MoralLeadership–CodeofConduct–CorporateSocialResponsibility.

TOTAL:45Hours

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TEXTBOOKS:

- 1. StephenP.RobbinsandMaryCoulter,'Management',PrenticeHallofIndia,8thedition.
- 2. CharlesWLHill,StevenLMcShane,'PrinciplesofManagement',McgrawHillEducation,2007.
- 3. MikeW.MartinandRolandSchinzinger, "Ethics inEngineering", TataMcGrawHill, NewDelhi, 2003. **REFERENCES:**
- 1. Hellriegel,Slocum&Jackson,'Management-ACompetencyBasedApproach',ThomsonSouthWestern,2007.
- 2. HaroldKoontz,HeinzWeihrichandMarkVCannice,'Management-Aglobal&EntrepreneurialPerspective',TataMcgrawHill,12thedition,2007.
- 3. AndrewJ.Dubrin, 'EssentialsofManagement', Thomson Southwestern, 7thedition, 2007.

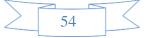
18HSPD51	PERSONALITYDEVELOPMENTIII	L	Т	Р	С
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Course Outcome: (Skill development)

- To develop the studentsto study theverbal apptitude
- To rate the Singular/plural-present tense/past tense
- To distinguish the softskills
- To compute the time management
- To explain the role of team building

UNITI VERBAL APPTITUDEI

Phonetics/NeutralAccent/Pronunciation – Speech Mechanism/Mouth & Face Exercise – Vowels & Consonants –Sounds – Syllable and Syllable Stress/ Word Stress – Sentence Stress & Intonation – Articulation Exercise – Rate ofSpeech /Flow ofSpeech / Idiomatic Phrases.



UNITII VERBAL APTITUDEII

Singular/plural-present tense/past tense—genders - Prepositions-conjunctions-Choice of words simple sentences—compoundsentences- summarising phrases—Synonyms—Antonyms— Analogies—Similar Words

UNITIII SOFTSKILLS IV

Attitude—Meaning- Features of attitude-Formation-Personality Factors-Types of attitude-change in attitude-DevelopingPositiveattitude.

UNITIV TIME MANAGEMENT

Definition –Meaning-Importance, Value of time as an important resource-
ofinfluenceandcircleofcontrol—DefinitionofURGENTandIMPORTANT—
TimeWastersandhowtoreduce—Procrastination—meaningandimpact-4Quadrants.

UNITV TEAM BUILDING

Meaning—Aspects of team building—Process of team building—Types of Teams-Team ethics and Understanding-Teamtrust and commitment

REFERENCES:

- 1. Managing Soft Skills And Personality--B NGhoshMcgraw HillPublications
- 2. PrinciplesandPractices ofManagementShejwalkarandGhanekar McGrawHillLatest
- 3. TimemanagementforBusypeople-Robertaroesch,TatamcGraw-HillEdition
- 4. PersonalityDevelopment--DrVMSelvaraj,BhavaniPublications

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TOTAL:30Hours

18PCAU55 PERFORMANCE ANDEMISSION TESTING LABORATORY L T P C

Course outcome: (skill development)

- To design thePressurepickups, charge amplifier, storage oscilloscope and signal analyzers.
- To evaluate the performance of petrol and diesel engines both at full load and part load conditions.
- To examine Morsetest onpetrolengine.
- To compute the compression ratio, volumetric

efficiency in engines.

• To explain the

Heatbalancetestonanautomotiveengine.

LIST OF EXPERIMENTS

- 1. StudyofPressurepickups,chargeamplifier,storageoscilloscopeandsignalanalysersusedforICenginetest ing.
- $\label{eq:performancestudy} 2. Performancestudy of petrol and diese lengines both at full load and part load conditions.$
- 3. Morsetestonpetrolanddieselengines.
- 4. Determinationofcompressionratio, volumetric efficiency and optimum cooling waterflow rate in engines.
- 5. Heatbalancetestonanautomotiveengine.
- 6. Testingof2and4wheelersusing chassisdynamometers.
- 7. StudyofNDIRGasAnalyserandFID
- 8. StudyofChemiluminescentNOxanalyzer
- 9. MeasurementofHC,CO,CO2,O2usingexhaustgasanalyzer
- 10. Dieselsmokemeasurement.

TOTAL:45Hours

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18PCAU56

COMPUTERAIDEDAUTOMOTIVECOMPONENTS DESIGNLABORATORY

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Course outcome: (skill development)

- Todevelopthestudentstousemodelingsoftwaretomodelenginecomponentsdesign
- To review the designanddrawingofpiston.
- To examine the drawing of Piston pinand pi
- To apply the concept of the connecting rod assembly
- To explain the design of crankshaft, balancing weight calculations.

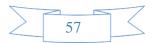
LIST OF EXPERIMENTS

- 1. Designanddrawingofpiston.
- 2. Pistonpinandpistonringsanddrawingofthese components.
- 3. Designofconnectingrodsmallendandbigend, shankdesign, designofbigendcap, boltsanddrawing
- oftheconnectingrodassembly
- 4. Designofcrankshaftandbalancingweightcalculation.
- 5. Developmentofshortandlongcrankarms, frontendandrearenddetails, drawing of the crankshaft assembly.
- 6. Designanddrawingofflywheel.
- 7. Ringgeardesign, drawing of the flywheel including the development of ringgeart eeth.
- 8. Designanddrawingoftheinletandexhaustvalves.
- 9. Designofcamandcamshaft,camprofilegeneration,drawingofcamandcamshaft
- 10. Completedesignofclutchcomponents.

THELIST OF QUIPMENTS FOR ABATCHOF 30 STUDENTS

- 1. Computernodes-30Nos.
- 2. SoftwarelikeAutoCADorPro-E-15licenses

TOTAL:45Hours



Course Outcome: (Employability)

- Todevelop theelectrical and electronic components used in automobiles.
- To select the sub-systems of an Automobile and 4stroke ICE ngine.
- To classify theautomotivesensors and actuators, their application and uses
- To compute the Engine System, Chassis, Transmission, Power train, Braking Systems etc
- To explain anoverviewofautomotivecomponents,subsystems,designcycles,communicationprotocols.

UNITI BATTERIESANDSTARTINGSYSTEM

DifferenttypesofBatteries-

principle,rating,testingandcharging.Startermotorscharacteristics,capacityrequirements.Drivemechani sms. Starter switches.

UNITII CHARGINGSYSTEMLIGHTINGANDACCESSORIES

DC Generators and Alternators their characteristics. Control unit – cut out, electronic regulators. Vehicle

lightingsystem.Vehicleexteriorlightingsystem.Wiringrequirements.Lightingdesign.Dashboardinstrum ents.Horn,trafficator.

UNITIII ELECTRONIC IGNITION ANDINJECTIONSYSTEM

Sparkplugs. Advance mechanisms. Different typesof ignition systems. Electronicfuel injection systems, mono and multipoint fuel injection system (MPFI).

UNITIV SAFETYSYSTEMS

Antilock braking system, air bag restraint system, voice warning system, seat belt system, road navigation system, antitheft system.

UNITV SENSORSANDMICROPROCESSORSINAUTOMOBILES

Basic sensor arrangements. Types of sensors – oxygen sensor, hot wire anemometer sensor, vehicle speed sensor, detonation sensor, accelerometer sensor, crank position sensor. Microprocessor and microcomputer controlled devices automobiles such voice warning system, travel information system, keyless entry system, automatic transmissionsystem, electronicsteering system.

TOTAL:45Hours

TEXTBOOKS:

- 1. YoungA.P. & Griffiths. L. "AutomotiveElectrical Equipment", ELBS & NewPress-1999.
- 2. WilliamB.Riddens"UnderstandingAutomotiveElectronics",5thedition ButterworthHeinemannWoburn,1998.
- 3. Crouse,W.H"AutomobileElectricalEquipment",McGraw-HillBookCo.,Inc.,NewYork,3rdedition,1986.

REFERENCES:

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.



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- 2. JudgeA.W"ModernElectricalEquipmentofAutomobiles",Chapman&Hall,London,1992.
- 3. Kholi.P.L"AutomotiveElectricalEquipment",TataMcGraw-HillCo.,Ltd.,NewDelhi,1975.
- 4. RobertBosch"AutomotiveHandBook",SAE(5thEdition),2000.
- 5. Ganesan.V."InternalCombustionEngines",TataMcGraw-HillPublishingCo.,NewDelhi,2003.



Course Outcome: (Employability)

- TodesigntheConstructionaldetailsandTheoryofimportantdriveline.
 Toselect theStooring Broking and Support Support of Automatical
- Toselect theSteering,Braking andSuspensionSystems ofAutomobile.
 Toexamine theknowledgeonProblem-SolvinginSteering, andSuspensionSystems.
- To apply the concept in gear box.
- To describe the DriveLine and RearAxle.

UNITI VEHICLE FRAMEANDSUSPENSION

Study of loads-moments and stresses on frame members. Design of frame for passenger and commercial vehicle -DesignofleafSprings-Coil springs and torsion barsprings.

UNITII FRONT AXLEANDSTEERINGSYSTEMS

Analysis of loads-moments and stresses at different sections of front axle. Determination of bearing loads at Kingpinbearings. Wheel spindle bearings. Choice of Bearings. Determination of optimum dimensions and proportions forsteeringlinkages,ensuringminimum errorinsteering.Designoffront axlebeam.

UNITIII CLUTCH

Design of single plate clutch, multiplate clutch and cone clutch. Torque capacity of clutch. Design of clutch components,Designdetailsofroller andsprag type of clutches.

UNITIV GEAR BOX

Gear train calculations, layout of gearboxes. Calculation of bearing loads and selection of bearings. Design of threespeedandfour speed gearboxes.

UNITV DRIVELINE ANDREARAXLE

Design of propeller shaft. Design details of final drive gearing. Design details of full floating, semifloating and threequarterfloatingrear shaftsandrearaxlehousingsanddesignaspectsoffinal drive.

TOTAL:45Hours

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TEXTBOOKS:

- 1. Giri,N.K.,"AutomobileMechanics", Khannapublishers,NewDelhi,2007.
- 2. Khurmi. R.S. & Gupta. J.K., "A textbook of Machine Design", Eurasia Publishing House (Pvt)Ltd,2001.

REFERENCES:

- 1. DeanAverns,"AutomobileChassis Design",IllifeBookCo.,2001.
- 2. Heldt, P.M., "AutomotiveChassis", ChiltonBookCo., 1992.



18PCAU62 AUTOMOTIVECHASSISCOMPONENTSDESIGN

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Course Outcome: (Employability)

- To implement the constructional details operating characteristics and vehicle design aspect
- To<mark>select</mark> the chassisand sub-systems
- To differentiate the brakes, wheels and tyres
- To compute the two wheelers in industry
- To demonstrate the three wheelers

UNITI POWER UNIT

Two stroke SI engine, four stroke SI engine; merits and demerits, Symmetrical and unsymmetrical port timing

diagrams,Typesofscavengingprocesses,meritsanddemerits,scavengingpumps,Rotaryvalveengine.Fuel system,Lubrication system. Magneto coil and battery coil spark ignition system, electronic ignition system. Starting system, Kickstarter system.

UNITII CHASSISANDSUB-SYSTEMS

Mainframe and its types. Chassis and shaft drive, Single, multiple plates and centrifugal clutches. Gear box and gearcontrols.Frontandrearsuspensionsystems.Shock absorbers.Panel metersandcontrols onhandlebar.

UNITIII BRAKES, WHEELSANDTYRES

Brakes-Drum brakes, disc brakes, front and rear brake links, layouts, Wheels-Spoked wheel, cast wheel, disc wheel, disc types. Tyres and tubes.

UNITIV TWO WHEELERS

Case study of major Indian models of motorcycles, scooters and mopeds, TVS mopeds and motorcycles, Hero Hondamotorcycles, Bajaj scooters andmotorcycles, Yamaha, Enfield motorcycles. Servicingandmaintenance.

UNITVTHREE WHEELERS

Case study of major Indian models of three wheeler-, Bajaj Auto rickshaws, pickup vans, delivery vans, Ape load autosandtrailer, Servicing and Maintenance: daily, weekly, monthly, Fault tracing.

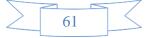
Total:45Hours

TEXTBOOKS:

1. Irving.P.E.-MotorCycleEngineering-TemplePressBook,London-1992.

REFERENCES:

- 1. TheCycleMotorManual-TemplePressLimited,London-1990
- 2. EncyclopediaofMotorcycling- 20volumeMarshall,Cavensih,UK-1989



- 3. BrayantR.V,Vespa-MaintenanceandRepairSeries-S.Chand&Co.,NewDelhi-1986.
- 4. RaymondBroadLambretta-APracticalGuidetomaintenanceandrepair–S.Chand.&Co.,NewDelhi-1987.

18PEAU01	VEHICLEDYNAMICS	L	Т	Р	С
		3	0	0	3

Course Outcome: (Employability)

- Toproduce the vibrations and how to reduce the vibration under different loads.
- Toreview theroadconditionsinordertoimprovethecomfort for the passengers.
- To compare the performance characteristics of vehicle
- To compute the handling characteristics of vehicles
- To review the dynamics of suspensionsystem

UNITI BASICOF VIBRATION

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Classification of vibration, definitions, mechanical vibrating systems, mechanical vibration and human

Modelingandsimulationstudies.Singledegreeoffreedom,free,forcedanddampedvibrations.Magnificatio nfactorandtransmissibility.Vibrationabsorber.Vibrationmeasuringinstruments.Twodegreeoffreedoms ystem.Modalanalysis.

UNITII TYRES 12

Tireforces and moments, Tirestructure, Longitudinaland Lateral forceatvariousslipangles, rolling resistance, Tractive and corneringpropertyof tire. Performanceof tire on wet surface.Ride property of tires. Test on Various roadsurfaces. Tire vibration.Surface.Surface.

UNITIII PERFORMANCE CHARACTERISTICSOF VEHICLE

Equation of motion and maximum tractive effort. Aerodynamics forces and moments. Power plant and transmissioncharacteristics.Predictionofvehicleperformance.Brakingperformance-BrakingForce,BrakeFactor,BrakingEfficiencyandStopping Distance.

UNITIV HANDLINGCHARACTERISTICSOF VEHICLES

Mathematical model of handling, Fundamental condition for true Rolling Steady State Handling: Slip angle, corneringpower, Neutral steer, under steer and over steer, Steady state response, Lateral Acceleration, Transient responsecharacteristics.Directionalstability of vehicle.

UNITV DYNAMICSOF SUSPENSIONSYSTEM

Requirements of suspension system. Spring mass frequency, wheel hop, Wheel wobble, wheel shimmy, choice of suspension spring rate. Calculation of effective spring rate. Vehicle suspension in fore and aft, Hydraulic dampers and choiceof damping characteristics. Compensated suspension systems.

TOTAL:60Hours

TEXTBOOKS:

- 1. RaoJ.SandGupta.K "TheoryandPractice of Mechanical Vibrations", WileyEastern Ltd., 2002.
- J.Y.Wong, Theoryofgroundvehicle', 4thEdition, JohnWileyandSonsInc., Newyork, 2008
- 3. Dr.N.K.Giri, "AutomobileMechanics", Seventhreprint, KhannaPublishers, Delhi, 2005



REFERENCES:

- 1. MassimoGuiggiani, "TheScienceofVehicleDynamics:Handling,Braking,andRideofRoadandRaceC ars", Springer, 2014 edition
- Groover, "MechanicalVibration", 7thEdition, NemChand&Bros, Roorkee, India, 2003. W. Steeds, 'Mechanicsofroadvehicle'IlliffeBooksLtd, London 1992 2.
- 3.
- JG.Giles, 'Steering, Suspensiontyres', IllifeBooksLidLondon1975 4.
- 5. P.M.Heldt, 'Automotivechassis', ChiltonCo., Newyork, 1982

18PEAU06	ALTERNATIVE FUELS AND ENERGY SYSTEM	L	Т	Р	С
		3	0	0	3

Course Outcome: (Employability)

- To develop the need of the alternative fuels
- To select the need of the Gaseousfuels.
- To classify the performance characteristics of alcohols fuels
- To implement the natural gas, LPG, hydrogen, and biogas.
- To explain the electric, hybrid, fuel cell and solar cars

UNIT I INTRODUCTION

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources. Like EV, hybrid, fuel cell and solar cars.

UNIT II ALCOHOLS

Properties as engine fuel, alcohols and gasoline blends, performance in SI engine, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS

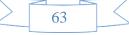
Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG using LPG in SI & CI engines, performance and emission of LPG. Hydrogen; storage and handling, performance and safety aspects.

UNIT IV VEGETABLE OILS

Various vegetable oils for engines, desertification, performance in engines, performance and emission characteristics, bio diesel and its characteristics

UNIT V ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar



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powered vehicles.

TEXT BOOK:

1. Richard.L.Bechfold – Alternative Fuels Guide Book - SAE International Warrendale - 1997.

REFERENCES:

1. Maheswar Dayal - "Energy today & tomorrow" - I & B Horishr India - 1982.

2. Nagpal - "Power Plant Engineering" - Khanna Publishers - 1991.

3. " Alcohols as motor fuels progress in technology" - Series No.19 - SAE

Publication USE - 1980. 4. SAE paper nos. 840367, 841333, 841334, 841156,

Transactions, SAE, USA.

18GEAU06 ENERGYAUDITANDENERGYCONSERVATIONMETHODS L T P C

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Course Outcome: (Employability)

- To develop theknowledgeaboutenergy auditandenergy conservation methods in I.C. Engines.
- To select theenergysources, utilization and policies
- To classify the energy conservation in industries and buildings
- To usethevariousenergydevelopingsystems
- To explain the energymanagement and auditing

UNITI ENERGY ANDENVIRONMENT

Introduction - fossil fuels reserves - world energy consumption - green house effect, global warming -Renewable energysources- environmentalaspectsutilization-energyprizes- <mark>energypolicies</mark>.

UNITII ENERGY CONSERVATION

Energyconservationschemes-industrialenergyuse-<mark>energysurveying</mark>andauditing-energyindex– Energycost-cost index - energy conservation in engineering and process industry, in thermal Systems, in buildings and non-conventionalenergyresources scheme

UNITIII ENERGY TECHNOLOGIES

Fuels and consumption - boilers - furnaces - waste heat recovery systems - heat pumps and Refrigerators - storagesystems- insulated pipeworksystems - heat exchangers.

UNITIV ENERGY MANAGEMENT

Energymanagementprinciples-energyresourcemanagement-energymanagementinformationSystemsinstrumentationandmeasurement- computerizedenergymanagement-energyAuditing.

UNITV ECONOMICS ANDFINANCE

Costingtechniques- costoptimization - optimaltarget investmentschedule- financial appraisaland



Total: 60 Hours

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Profitability -projectmanagement.

TOTAL:45Hours

TEXTBOOKS:

- 1. MurphyW.R.andMcKAYG., "EnergyManagement,Butterworths,London,1982.
- 2. TrivediP.R.,JulkaB.R.,"EnergyManagement",Commonwealthpublishers,1997.

REFERENCES:

- 1. DavidMerick,RichardMarshal,"Energy,presentandfutureoptions",Vol.IandII,JohnWileyandSons,19 81.
- 2. ChaigierN.A."EnergyConsumptionandEnvironment",McGraw-Hill,1981.
- 3. IkkenP.A.SwartR.JandZwerves.S, "ClimateandEnergy", 1989.
- 4. RayD.A."IndustrialEnergyConservation",PergamaonPress,1980.

18HSPD61	PERSONALITYDEVELOPMENTIV	L	Т	Р	С
		2	0	0	2

Course Outcome: (Skill development))

- To develop the studentsto study the soft skills
- To rate the communication skills
- To distinguish the presentation skills
- To compute the slide presentation
- To explain the role of change management

UNITI SOFTSKILLS V

Assertiveness—Meaning—Importance of assertiveness- Characteristics of assertive communication-Merits –forms of assertion—Causes of misunderstanding

UNITII COMMUNICATIONSKILLS

Meaning—Elementsofcommunication—Functionsofcommunication—Principlesofcommunication— FormalandInformalcommunication—BarriersinCommunication— Characteristicsofgoodcommunication— Feedback—communication systems.

UNITIII PRESENTATION SKILLS I

Meaning—ImportanceofPresentation—<mark>Conceptof5w's</mark>andoneH -- understandingtheaudience— Typesofpresentations—Howto make effectivepresentation

UNITIV PRESENTATION SKILLS II

Use of slide, PPT's. and visuals—Rules for slide presentation—precautions ---seminars and conferences-Steps toeliminateStage fear.



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UNITV CHANGEMANAGEMENT

Definition – Necessity - Resistance towards Change – 10 Principles of Change Management – Leaders approach –EffectiveChangemanagement.

TOTAL:30Hours

REFERENCES:

- Helpingemployeesembracechange-LaClair,J.andRao,R.HelpingEmployeesEmbraceChange,McKinseyQuarterly,2002,Number4.
- 2. WhoMovedMyCheese bySpencerJohnsonpublishedbyVermilionfirstedition
- 3. EffectiveCommunication.Adair,John.London:PanMacmillanLtd.,2003.
- 4. BusinessCommunicationToday:Bovee,CourtlandL,JohnV.Thill&BarbaraE.Schatzman.TenthEditio n.NewJersey:Prentice Hall,2010.



18PCAU64 AUTOMOTIVEELECTRICALANDELECTRONICS LABORATORY

L T P C 0 0 2 1

Course Outcome: (Skill Development)

- To design the batteries
- To justify the starting motors and generators
- To examine the **Testing** of regulators
- To compute the Diagnosis of ignition system faults
- To describe the automobile electrical wiring.

LIST OF EXPERIMENTS

a. ElectricalLaboratory

- 1. Testingofbatteriesandbatterymaintenance
- 2. Testingofstartingmotorsandgenerators
- 3. Testingofregulatorsandcut– outsrelay
- 4. Diagnosisofignitionsystemfaults
- 5. Studyofautomobileelectricalwiring

b. ElectronicsLaboratory

- 6. Studyofrectifiers and filters
- 7. Studyoflogicgates, adder and flip-flops
- 8. StudyofSCRandICtimer
- 9. InterfacingA/Dconverterandsimpledataacquisition
- 10. Microcontrollerprogrammingandinterfacing

THELIST OF EQUIPMENTS -Each 1No (ForABatchof30Students)

i. Battery,hydrometer,voltagetester

- ii. Starter motor, regulator, cutout
- iii. Distributor,ignitioncoil,sparkplug
- iv. Autoelectricalwiringsystem
- v. Rectifiers, filters
- vi. Amplifier
- vii. IC timer
- viii. Datalogger

TOTAL:45Hours

SUMMER INTERNSHIP

Course Outcome: (Skill Development)

- To develop the real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets
- To select the career options by considering opportunities in company, sector, industry, professional and educational advancement
- To compare the Communicate and collaborate effectively and appropriately with different professionals in thework environment
- To apply the critical thinking and problem solving skills by analysing underlying issue/s tochallenges
- To **Demonstrate the ability to harness resources** by analysing challenges and consideringOpportunities

The objective of the Summer Internship training is to enhance and improve the skill set and knowledge of the automobile engineering students which boost their performance and consequently helping them to meet their career objectives. Training helps learners to acquire the latest techniques, skills, methodologies and to build a strong foundation for their career growth. Three periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the faculty. The student has to undergo a training of 10 to 12 days during the semester in the automotive related industries and submit a detailed report based on the industry, products and services, things learned from the industry. This final report shall be typewritten form as specified in the guidelines

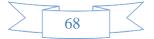
18PEAU02	VEHICLE MAINTENANCE	L	Т	Р	С	
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Course Outcome: (Employability)

- Toproposecompleteknowledgeofthevehiclemaintenanceprocedures.
- To<mark>rate theknowledge</mark>onenginemaintenance–repairandoverhauling.
- To distinguish themaintenance and servicing of suspension systems.
- To solve the fault diagnosis and maintenance of modern electronic controls.
- To ExplaintheServicingandmaintenance offuelsystemofdifferenttypesofvehicles.

UNITI MAINTENANCEOF RECORDSANDSCHEDULES

Requirements and importance of maintenance, types of maintenance, preparation of check lists,Inspection schedule,maintenance of records, log sheets and other forms, safety precautions in maintenance. Motor vehicle acts, insuranceetcandtraffic rules, motor vehicle driving rules and regulation.



UNITII ENGINEMAINTENANCE – REPAIRANDOVERHAULING

Dismantling of engine components and cleaning, cleaning methods, visual anddimensionalinspections,minor

and major reconditioning of various components, reconditioning methods, engine assembly, special tools us edform a intenance over hauling, engine tune up, including modern engines.

UNITIII CHASSISMAINTENANCE - REPAIRANDOVERHAULING

Mechanical and automobile clutch, fluid flywheel, torque converter, automatic transmission and gear box, servicing andmaintenance. Maintenance servicing of propeller shaft and differential system.Maintenanceservicing ofsuspensionsystems. Brake systems, typesandservicingtechniques.Steeringsystems,overhaulingandmaintenance.Wheelalignment,compute rized alignmentandwheelbalancing.

UNITIV ELECTRICAL ANDELECTRONICSYSTEM MAINTENANCE

Testing methods for checking electrical and electronic components, checking battery, starter motor, chargingsystems,DC generator and alternator, ignitions system, lighting systems. Fault diagnosis and maintenance of modern electroniccontrols,checking andservicing ofdashboardinstruments.

UNITV MAINTENANCEOFFUEL,COOLING,LUBRICATIONSYSTEMSANDVECHICLEBODY 8

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply. Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives. Lubricationmaintenance, lubricating oil changing, greasing of parts. Vehicle body maintenance, minor and major repairs. Doorlocks and window glass actuating systemmaintenance.

TOTAL:45Hours

TEXTBOOKS:

- 1. JohnDoke"FleetManagement",McGraw-HillCo.1984.
- 2. Automotive Mechanics W.H. crouse

REFERENCES:

- 1. JamesDHalderman-AdvancedEnginePerformanceDiagnosis-PHI1998.
- 2. ServiceManualsfromDifferentVehicleManufacturers.66
- 3. AutomobileEngineering byKirpalSingh
- 4. BoschHandBook-3rdEditionSAE1993.

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Course Outcome: (Employability)

- To develop the combustion phenomenon inside the cylinder and its computer simulation
- To review the SI engine simulation with fuel air as working medium •
- To compare the Actual cycle simulation in SI engines
- To compute the Simulation of 2-stroke SI engine •
- To identify the Diesel engine simulation

UNIT - I INTRODUCTION

Introduction. Heat of reaction, complete combustion in C/H/O/N Systems, Constant volume adiabatic combustion, constant pressure adiabatic combustion. Calculation of adiabatic flame temperature.

UNIT - II SI ENGINE SIMULATION WITH FUEL AIR AS WORKING MEDIUM

Deviation between actual and air standard cycles of operation- problems, SI engine simulation with adiabatic constant volume combustion with fuel and air being considered, calculation of temperature drop due to fuel vaporization, calculation of mean effective pressure, torque and thermal efficiency at full throttle, part throttle and supercharged conditions.

UNIT - III ACTUAL CYCLE SIMULATION IN SI ENGINES

Progressive combustion; gas exchange process, heat transfer process, friction. Validation of the computer code with experimental data based on performance parameters and pressure crank angle diagram.

UNIT - IV SIMULATION OF 2-STROKE SI ENGINE

Simulation of the scavenging process, determination of the pressure-crank angle variation, computation of performance parameters.

UNIT - V DIESEL ENGINE SIMULATION

Main difference between SI and CI engine simulation, differences between ideal and actual cycles, zero dimensional combustion model for diesel engine, heat transfer and gas exchange processes. Performance prediction and comparison of results.

TEXTBOOKS:

- 1. Ganesan.V.-ComputerSimulationofsparkignitionengineprocess,-UniversitiesPress(I)Ltd,1996.
- 2. Ganesan.V.-ComputerSimulationofcompressionignitionengineprocess–UniversitiesPress(I)Ltd,2000.
- 3. AshleyCampbel-Thermodynamicanalysisofcombustionengines-JohnWileyandSons,NewYork- 1986.

REFERENCES:

1. Benson.R.S., Whitehouse.N.D., -InternalCombustionEngines-PergamonPress, oxford, 1979



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TOTAL:45Hours

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 ${\tt 2. Ramoss. A.L., -Modelling of Internal Combusion Engines Processes - McGraw-Hill Publishing Co., 1992}$



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Course Outcome: (Employability)

- To<mark>developknowledge</mark>intheconstructionofvehicle.
- Toassesstheaerodynamicconcept&panellingofpassengercarbodytrim.
- To<mark>examinethedesign</mark>ofexternalvehiclebody.
- To implement the various heavyvehicle bodies.
- To describe the different types of painting techniques for vehicle body

UNITI CARBODYDETAILS

Typesofcarbodies-visibility:regulation,driver'svisibility,methodsofimprovingvisibility-safety:safetydesign,safetyaspects.Constructionaldetailsofapassengercar.

UNITII BUSBODYDETAILS

Classificationofbusbodies-

based on distance traveled, based on capacity of the bus and based on style & shape. Types of metal section used in the construction. Construction of Conventional and integral type bus.

UNITIII CARAERODYNAMICS

Objects—Vehicletypesofdrag.Varioustypesofforcesandmoments.Effectsofforcesandmoments.Variousbodyoptimizationtechniques for minimum drag. Principle of windtunnel technology. Flow visualization techniques. Testwithscale models.

UNITIV COMMERCIALVEHICLEDETAILS

Classification of commercial vehicle bodies. Construction of Tankerbody and Tipperbody. Dimensions of dri versseat in relation to controls. Driver's cabdesign. Compactness of Driver's cab. Segmental construction of driver's cab.

UNITVCOMMERCIALVEHICLEAERODYNAMICS

Effects of rounding sharp front body edges. Effects of different cab to trailer body Fore body pressure distribution.Effects of a cab to trailer body roof height. Commercial vehicle drag reducing devices. Modern painting process of apassengercar body.

TOTAL:45Hours

TEXTBOOKS:

- 1. Powloski, J., 'VehicleBodyEngineering', BusinessBooksLtd, 1970
- 2. J.G.Giles, 'BodyConstructionandDesign', ButterworthandCo., 1975

REFERENCES:

- 1. JohnFenton'VehicleBodylayoutandanalysis',MechanicalEngineeringPublicationLtd.,1984
- 2. HeinzHeisler, "AdvancedVehicleTechnology", secondedition, Butterworth– Heinemann, NewYork, 2002



18GEAU02

Course Outcome: (Employability)

- Todeveloptheunderstanding of Quality Management principles and process.
- To select the TQM principles.
- To organize TQM tools &techniques I
- To implement TQM tools &techniques II
- To explain the quality systems

UNITI INTRODUCTION

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and servicequality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby –Barriers to TQM.

UNITII TQM PRINCIPLES

Leadership–Strategicquality planning, Qualitystatements- Customerfocus–Customerorientation, Customersatisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team andTeamwork, Recognition and Reward, Performance appraisal -Continuous process improvement – PDSA cycle, 5s,Kaizen-Supplier partnership–Partnering,Supplier selection, SupplierRating.

UNITIII TQM TOOLS & TECHNIQUES I

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications tomanufacturing,servicesectorincludingIT–Benchmarking– Reasontobenchmark,Benchmarkingprocess–FMEA - Stages, Types.

UNITIV TQM TOOLS & TECHNIQUES II

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvementneeds–CostofQuality –Performance measures.

UNITV QUALITY SYSTEMS

TEXTBOOK:

NeedforISO 9000-ISO 9000-2000Quality System–Elements, Documentation,Quality auditing- QS 9000–ISO14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and servicesectorsincludingIT.

TOTAL:45Hours



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1.DaleH. Besterfiled,etcat"Total QualityManagement",PearsonEducationAsia,ThirdEdition, 2006. **REFERENCES:**

1. JamesR.Evansand

Lindsay, "TheManagementandControlofQuality", 6thEdition,South-Western(Thomson Learning),2005.

- 2. Suganthi, LandAnandSamuel, "TotalQualityManagement", PrenticeHall(India)Pvt.Ltd., 2006.
- 3. Janakiraman, BandGopal, R.K, "TotalQualityManagement– TextandCases", PrenticeHall(India)Pvt.Ltd.
- 4. R.Pugazhenthi, A.Baradeswaran, K.Balachandran, and P.Balamurali, "Total Quality Management", s amspublications, 2015.

L T P C 18PCAU71 VEHICLEMAINTENANCE&RECONDITIONINGLAB 0 0 2 1 CourseOutcome:(Skill Development)

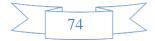
- To develop themaximumsavailability of vehicle without any major problem.
- To select thecustomerforsafedriving.
- To organize the students inmaintaining the vehicle ingood condition.
- Tousethestudentsinidentifyingthefaultandrectification.
- To explain the FaultDiagnosis of Ignition, StartingAndChargingSystem.

LISTOFEXPERIMENTSFORVEHICLEMAINTENANCE

- 1. StudyandLayoutofAutomobileRepairShop.
- 2. StudyandPreparationofWorkshopStatements.
- 3. StudyandListofTools And Instruments.
- 4. MinorandMajorTuningofDieselAndPetrol Engines.
- 5. FaultDiagnosisofIgnition,StartingAndChargingSystem.
- 6. FaultDiagnosisofPetrolAndDieselFuelSystemAndFilters&AirCleaners.
- 7. FaultDiagnosisofLightingSystemHorn&Wiper.
- 8. Performing Body RepairWorks.
- 9. AdjustmentOfPedalPlayInClutchBrake,HandBrakeAndSteeringWheel.
- 10. A)BleedingOfHydraulicBrakeSystemandDieselFuelSystem.
 - B) WheelBearingAdjustment.
 - C) AdjustmentofHeadLights.

LIST OF EQUIPMENTS FOR VEHICLE MAINTENANCE LABORATORY

- 1. Cylinderreboring-checkingthecylinderbore.
- 2. Valvegrinding, valvelapping.
- 3. Settingthevalveangleandcheckingforvalveleakage
- 4. Wheelalignment-testingofcamber,caster.
- 5. Testingkingpininclination,toe-inandtoe-out.
- 6. Brakeadjustment
- 7. Brakebleeding.



WilliamM.

8. RemovalofTyre&Tube.

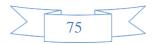
LISTOFEXPERIMENTSFORVEHICLERECONDITIONING

- 1. Engine Analyzer
- 2. Cylindercompressionpressuregauge
- 3. Vacuumgauge
- 4. Sparkplugcleanerandtester
- 5. Camangleandrpmtester
- 6. Tacho-meter
- 7. Wheelalignmentapparatus
- 8. Gasweldingequipment
- 9. Bearingpuller
- 10. Headlightalignmentgauge
- 11. Servicemanualsofpetrol, dieselengines

LISTOFEQUIPMENTSFORVEHICLERECONDITIONING

- 1. Cylinderre-boringmachine
- 2. Valvegrindingmachine
- 3. Valvelappingmachine
- 4. Wheelalignmentapparatus
- 5. Tyre remover

TOTAL:45Hours



18MEA031

PROJECT PHASE -I

L T C P 0 0 9 18

Course Outcome: (Skill Development)

- To design a sound technical knowledge of their selected project topic.
- To review the problem identification, formulation and solution.
- To compare the engineering solutions to complex problems utilising a systems approach.
- To compute an engineering project.
- To explain the project working model.

The objective of the project work is to enable the Student who individually carryout the project. This Project which involves theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project. Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines. The continuous assessment shall be made as prescribed by the regulation.

18HSAU71 N.S.S С L т 2 1 Λ Course Outcome: (Skill Development) To develop the concepts of NSS.s • To evaluate NSS programs and activities. • To organize understanding youth • To apply the communitymobilization To explain the volunteerism and shramdan • INTRODUCTIONANDBASICCONCEPTSOF NSS UNITI 6 NSS: History, philosophy, aims, objectives -Emblem: flag, motto, song, badge- NSS functionaries: Organizationalstructure, roles and responsibilities. UNITII **NSSPROGRAMS ANDACTIVITIES** 6 Concept of regular activities- special camping-day camps-Basis of adoption of village/slums, Methodology of conductingsurvey-Financial pattern of the scheme- other youth program/schemes of GOI- Coordination with different agencies-Maintenanceofthe dairy

UNITIII UNDERSTANDINGYOUTH

Youth:Definition,profile of youth, categories – youth: Issues, challenges and opportunities - Youth asanagentofsocial change.

UNITIV COMMUNITYMOBILIZATION



6

Mapping of community stakeholders-Designing the message in the context of the problem and the culture of the community-Identifyingmethods of mobilization-Youth adultpartnership

UNITV VOLUNTEERISM ANDSHRAMDAN IndianTraditionofvolunteerism-Needs&Importanceofvolunteerism-Motivationandconstraintsofvolunteerism-Shramdanasapartofvolunteerism.

18PEAU24	AUTOMOTIVEAIR-CONDITIONING	L	Т	Р	С
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Course Outcome: (Employability)

- Toinventthecomponents of the automotive air-conditioning and their functions.
- To<mark>rankwithlatestdevelopments</mark>inthisfield.
- To classify theairconditioningprotection.
- To compute the handlingrefrigerants & diagnostic procedure.
- Toexplaintheairconditionermaintenanceandservice.

UNITI AIRCONDITIONINGFUNDAMENTALS

Basic air conditioning system - location of air conditioning components in a car, schematic layout of a refrigerationsystem, compressor components, condenser and high pressure service ports, thermostatic expansion valve, expansion valve calibration, controlling evaporator temperature, evaporator pressure regulator, evaporat or temperature regulator.

UNITII AIRCONDITIONER- HEATINGSYSTEM

Automotive heaters, manually controlled air conditioner, heater system, automatically controlled airconditionerandheatersystems,automatictemperaturecontrol,airconditioningprotection,engineprotection.air

UNITIII REFRIGERANT

Containershandlingrefrigerants,tappingintotherefrigerantcontainer,refrigerationsystemdiagnosis,dia gnosticprocedure,ambientconditions affectingsystem pressures.

UNITIV AIRROUTINGANDTEMPERATURECONTROL

Evaporator airflow through the recirculation unit, automatic temperature control, duct system,controllingflow, vacuum reserve, testing the aircontroland handlingsystems.

UNITV AIRCONDITIONINGSERVICE

Air conditioner maintenance and service, servicing heater system removing and replacing

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TOTAL:30Hours

components, trouble shootingofaircontrolling system, compressor service.

TOTAL:45Hours

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TEXTBOOKS

- 1. WilliamH.CrouseandDonaldI.Anglin-"AutomotiveAirconditioning"-McGrawHill.-1990.
- 2. BoyceH.DWiggins-"AutomotiveAirConditioning"-Delmar-2002

REFERENCES

- 1. MitchellinformationServices,Inc-"MitchellAutomaticHeatingandAirConditioningSystems"-PrenticeHallInd.-1989.
- 2. PaulWeiser-"AutomotiveAirConditioning"-RestonPublishingCo.,Inc.,-1990.
- 3. MacDonald,K.I.,- "AutomotiveAirConditioning"- TheodoreAudelseries-1978
- 4. Goings.L.F.-"AutomotiveAirConditioning"- AmericanTechnicalservices-1974.

18GEAU09	INDUSTRIALMARKETINGANDMARKETRESEARCH	L	Т	Р	С
		3	0	0	3

Course Outcome: (Skill Development)

- To<mark>buildthenewerconcepts</mark>ofmarketingconceptslikestrategicmarketingsegmentation,pricing,a dvertisementandstrategic formulation.
- To rank the industrialmarketing, industrial demandand customer.
- To distinguish theproductpricing, pricedecision, discounts, purchase and leasing.
- To compute the market research and it types, sources and collection of marketing data.
- To describe indetail about the market research techniques.

UNITI INDUSTRIAL MARKETING

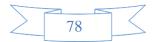
NatureofIndustrialMarketing:IndustrialMarketingVsConsumerMarketingRelationalapproachtoIndust rialMarketing- The Nature of Industrial Demand &Industrial Customer. Types of Industrial Products: Major Equipment;Accessory Equipment; Raw and Processed Materialsss; Component Parts and Sub-Assemblies; Operating Supplies;StandardizedandNon-standardized parts,Industrial services.

UNITIIPRICING

Pricing for Industrial Products – Pricing COURSE OUTCOME: (EMPLOYABILITY) - Price Decision Analysis –Breakeven analysis – netpricing – discount pricing – trade discounts – geographic pricing – factory pricing – freight allowance pricing – Terms ofSale–Outrightpurchase–Hire-purchase–Leasing.

UNITIIIMARKET RESEARCH

Introduction to Market Research, Types of Research – Basic & Applied, Nature, Scope, objective, Importance &Limitations of Market Research. Sources and collection of Marketing Data. Secondary data – Advantages &Limitations,Sources – Govt. & Non Govt. Primary Data – Advantages &Limitations, Sources, Methods of Collection Primary Data –Observation, Mail,Personal Interview, Telephonic Interview, Internet Interviewing.



UNITIVTECHNIQUES

Market ResearchTechniques. National<mark>readership</mark> survey, Retail StoreAudit, Consumer Panels,Test Marketing,ResearchinAdvertisingDecisions,MarketingAudit,DataBaseMarketing,FocusGroupIntervie ws.Sampling,Questionnaire & Scaling Techniques. Probability and Non Probability Sampling, Sampling methods, Sample Design,Questionnaire design and drafting. Scaling techniques like Nominal, Ordinal, Interval, Ratio, Perceptual Map, SemanticDifferential,Likert,Rating&RankingScales.

UNITV IMPLEMENTATION

Settingup & Implementation ofMarketing Research Project, Steps in formulating Market Research Projects,Oneprojectfor consumerdurablesan donefor nondurablestobediscussed.

TOTAL:45Hours

TEXTBOOKS:

- 1. RalphS.Alexander,JamesS.Cross,RichardM.Hill, "IndustrialMarketing",Homewood,1967.
- 2. RajendraNargundkar, "MarketingResearch", TataMcGrawHill, 2008.

REFERENCES:

- RobertR.Reeder;EdwardG.Brierty;BettyH.Reeder,"IndustrialMarketing-Analysis,PlanningandControl",PrenticeHall,1991.
- 2. GhoshPK, "IndustrialMarketing", OxfordUniversityPress, India.
- 3. RamanujMajumdar, "MarketingResearch-Text, Applications and CaseStudies".
- 4. DonaldR.Cooper, "BusinessresearchMethods", McGraw-Hill, 2005.

18GEAU07	ENTREPRENEURSHIPDEVELOPMENT	L	Т	Р	С
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Course Outcome: (Entrepreneurship)

• To<mark>implement</mark>

theentrepreneurialquality and motivation instudents and to impart basicent repreneurials kills an dunderst and ingtorunabusiness efficiently and effectively.

- To rate the entrepreneur towards motivation
- To organize the business
- To compute the financing and accounting
- To identify for support to entrepreneurs

UNITI ENTREPRENEURSHIP

Entrepreneur – Types of Entrepreneurs– Difference between Entrepreneur and IntrapreneurEntrepreneurship inEconomicGrowth, FactorsAffectingEntrepreneurial Growth.

UNITII MOTIVATION



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BusinessGames, ThematicApperceptionTest-StressManagement,Entrepreneurship DevelopmentPrograms-Need,objective.

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self Rating,

UNITIII BUSINESS

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Stepsinvolved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information– Classification of Needsand Agencies.

UNITIV FINANCING ANDACCOUNTING

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital,Costing,Break Even Analysis, Taxation –Income Tax, ExciseDuty–Sales Tax.

UNITV SUPPORT TO ENTREPRENEURS

SicknessinsmallBusiness-Concept,Magnitude,CausesandConsequences,CorrectiveMeasures-BusinessIncubators – Government Policy for Small Scale Enterprises – Growth Strategies in

smallindustry – Expansion, Diversification, Joint Venture, MergerandSub Contracting.

TOTAL:45Hours

TEXTBOOKS:

- 1. Khanka.S.S., "Entrepreneurial Development" S.Chand&Co.Ltd., RamNagar, NewDelhi, 2013.
- $\label{eq:constraint} 2.\ Donald FK uratko, ``Entrepreneurship-Theory, Process and Practice'', 9 th Edition, Cengage Learning, 2014.$

REFERENCES:

- 1. HisrichRD, PetersMP, "Entrepreneurship"8thEdition, TataMcGraw-Hill, 2013.
- MathewJManimala, "Enterprenuershiptheoryatcrossroads:paradigmsandpraxis" 2ndEditionDreamtech, 2005.
- 3. RajeevRoy,"Entrepreneurship" 2ndEdition,OxfordUniversityPress,2011.
- 4.EDII"FaultyandExternalExperts-

AHandBookforNewEntrepreneursPublishers:EntrepreneurshipDevelopment",Institute ofIndia, Ahmadabad, 1986.

REFERENCES:

- 1. Logistics and Supply Chain Management –Strategies for Reducing Cost and Improving Service. MartinChristopher,Pearson Education Asia, Second Edition.
- 2. Modelingthesupplychain, Jeremy F. Shapiro, Thomson Duxbury, 2002.
- 3. HandbookofSupplychainmanagement,JamesB.Ayers,St.LuclePress, 2000.



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PROJECT WORK PHASE II

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CourseOutcome:(Employability)

- To design a sound technical knowledge of their selected project topic.
- To review the problem identification, formulation and solution.
- To compare the engineering solutions to complex problems utilising a systems approach.
- To compute an engineering project.
- To explain the project working model.

The objective of the project work is to do a project individually which involves theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time of the institution. Six periods per week shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project. Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

