Shivaji University, Kolhapur

Syllabus Structure of Second Year (S.E. Auto.) Automobile Engineering Course

Scheme of Teaching and Examination

SEMESTER – III

Sr. No.	Name of the Subject	Teaching Scheme (Hrs)			Examination Scheme (Marks)			
		L	T	P	Theory	TW	Pract./ Oral	Total
1	Engg. Mathematics III	4	--	--	100	--	--	100
2	Engineering Thermodynamics	3	--	2	100	25	25	150
3	Fluid Mechanics	3	--	2	100	25	25	150
4	Engineering Materials	3	--	--	100	--	--	100
5	Electrical Technology	3	--	2	100	25	--	125
6	Measurement Techniques -I	--	--	2	--	25	25	50
7	Automotive Component Drawing	--	--	4	--	50	25	75
8	Workshop Practice-III	--	--	2	--	50	--	50
		16	0	14	500	200	100	800
Total Contact Hours per week				**30**	Total Marks			**800**

Shivaji University, Kolhapur

Syllabus Structure of Second Year (S.E. Auto.) Automobile Engineering Course

Scheme of Teaching and Examination

SEMESTER – IV

Sr. No.	Name of the Subject	Teaching Scheme (Hrs)			Examination Scheme (Marks)			
		L	T	P	Theory	TW	Pract./ Oral	Total
1	Programming & Computational Methods	3	--	2	100	25	--	125
2	Kinematics of Machines	3	--	2	100	25	--	125
3	Metallurgy & Metal Treatments	3	--	2	100	25	25	150
4	Fluid Machines	3	--	2	100	25	25	150
5	Strength of Materials	3	--	--	100	--	--	100
6	Manufacturing Processes	3	--	--	100	--	--	100
7	Computer Aided Drafting	--	--	2	--	25	25	50
8	Workshop Practice - IV	--	--	2	--	25		25
		18	0	12	600	150	75	825
Total Contact Hours per week				**30**	Total Marks			**825**

Compulsory summer vocational training in automobile garage for two weeks. Submission of training report as per
format and external evaluation of garage training at the end of semester V.

Shivaji University, Kolhapur

Syllabus Structure of Third Year (T. E. Auto.) Automobile Engineering Course

Scheme of Teaching and Examination

SEMESTER – V

Sr. No.	Name of the Subject	Teaching Scheme (Hrs)			Examination Scheme (Marks)			
		L	T	P	Theory	TW	Pract./ Oral	Total
1	Dynamics of Machines	3		2	100	25	25	150
2	Heat & Mass Transfer	3		2	100	25	25	150
3	Principles of Design & Component Design	4		2	100	50		150
4	Metrology & Quality Control	3		2	100	25		125
5	Automotive Transmission	3		2	100	25	25	150
6	Garage Training Evaluation						25	25
7	Vehicle Maintenance Laboratory – I			2*		25		25
8	Advanced Welding & CNC Machine Shop			2		25		25
		16	0	14	500	200	100	800
Total Contact Hours per week				**30**	Total Marks			**800**

* Combine utilisation for practical of vehicle maintenance laboratory I and garage training evaluation

Shivaji University, Kolhapur

Syllabus Structure of Third Year (T. E. Auto.) Automobile Engineering Course

Scheme of Teaching and Examination

SEMESTER – VI

Sr. No.	Name of the Subject	Teaching Scheme (Hrs)			Examination Scheme (Marks)			
		L	T	P	Theory	TW	Pract./ Oral	Total
1	Automotive Component Manufacturing	3			100			100
2	Industrial Organisation & Management	3			100			100
3	I. C. Engines	3		2	100	25	25	150
4	Automotive Chassis	3		2	100	25		125
5	Vehicle Body Engineering	3		2	100	25		125
6	Hydraulics & Pneumatics	3		2	100	25		125
7	Vehicle Maintenance Laboratory II			2		25	25	50
8	Mini Project on Modeling and or Design & seminar on project			2		25	25	50
		18	0	12	600	150	75	825
Total Contact Hours per week				**30**	Total Marks			**825**

Industrial Training of minimum Two Weeks in summer vocation in an automotive component manufacturing industry. The report of the training should be submitted in B. E.- I whose evaluation will be made by experts.

Shivaji University, Kolhapur

Syllabus Structure of Final Year (B. E. Auto.) Automobile Engineering Course

Scheme of Teaching and Examination

SEMESTER – VII

Sr. No.	Name of the Subject	Teaching Scheme (Hrs)			Examination Scheme (Marks)			
		L	T	P	Theory	TW	Pract./ Oral	Total
1	Engine & Machine Design	3		4	100	25	25	150
2	Vehicle Dynamics	4			100			100
3	Finite Element Analysis	3		2	100	25		125
4	Alternative Fuels & Emission	3		2	100	25	25	150
5	Electives – I	3		2	100	25		125
6	Industrial Case Study Evaluation						25	25
7	Engine Testing			2		25	25	50
	Project Phase I			2*		25	25	50
		16		14	500	150	125	775
Total Contact Hours per week				**30**	Total Marks			**775**
* Combine utilisation for project phase I and industrial case study evaluation								

Sr. No.	Electives – I
1	Noise and Vibration
2	Computer Simulation of Engine Process
3	Energy Engineering
4	Computer Integrated Manufacturing Systems
5	Industrial Product Design

Shivaji University, Kolhapur

Syllabus Structure of Final Year (B. E. Auto.) Automobile Engineering Course

Scheme of Teaching and Examination

SEMESTER – VIII

Sr. No.	Name of the Subject	Teaching Scheme (Hrs)			Examination Scheme (Marks)			
		L	T	P	Theory	TW	Pract./ Oral	Total
1	Refrigeration & Air Conditioning	3		2	100	25	25	150
2	Automotive Electronics	3		2	100	25		125
3	Automotive System Design	3		4	100	25	25	150
4	Vehicle Performance	3		2	100	25	25	150
5	Elective – II	3			100			100
6	Project			5		75	75	150
		15		15	500	175	150	825
Total Contact Hours per week				**30**	Total Marks			**825**

Sr. No.	Elective- II
1	Reliability Engineering
2	Transport Management
3	Entrepreneurship Development
4	Tractor and Farm Equipment
5	Production Management

S.E. (Automobile) PART-I

1. ENGINEERING MATHEMATICS – III

Teaching Scheme: Examination Scheme:

Lectures : 4 hrs/week Theory Paper : 100 marks (3 hrs. duration)

SECTION – I

1. Linear Differential equations: Linear differential equations with constant coefficients (without method of variation of parameters), Homogenous linear differential equations,
   08

2. Applications of Linear differential equation

   1. Damped free and forced oscillations

   2. Deflection of beams and columns

   3. Electrical engineering problems. 06

3. Partial Differential equations:

   First order partial differential equations and methods of solution (Four standard forms) 06

4. Higher order partial differential equation.

Homogeneous linear partial differential equations with constant coefficients

Non- Homogeneous linear partial differential equation

Equations reducible to partial differential equations with constant coefficients

08

SECTION – II

5. Applications of linear partial differential equations:

1. Vibrations of Stretched strings

2. One dimensional wave equation.

3. One dimensional heat flow

4. Two dimensional heat flow

5. Solution of Laplace equation in two dimensions 10

6. Laplace Transform:

Definitions, Properties, Transforms of standard functions, , Transforms of derivatives and integral, Inverse Laplace Transform, Convolution theorem, 05

7. Laplace Transform of Special Functions and its Applications:

Periodic, Heaviside function Application to solve linear differential equations with constant coefficients. 05

8. Fourier Series:

Definitions, Euler's formulae, Expansion of function (extended), Change of interval, Expansion of even and odd functions, half range series. 08

BOOKS

1. P.N. Wartikar and J.N. Wartikar, A Text Book of Applied Mathematics, Vol –I, Vol- II, Vidhyarthi Griha Prakashan, Pune.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
3. N.P. Patil, Ashok Saxena and N. Ch. S.N. Iyengar, Laxmi Publications, New Delhi.
4. Jaggi & Mathur, Advanced Engineering Mathematics, Dhanpat Rai & Sons
5. Erwin, Advanced Engineering Mathematics, John Willey

S.E. (Automobile) PART-I

2. ENGINEERING THERMODYNAMICS

Teaching Scheme:

Lectures : 3 hrs/week

Practical : 2 Hrs. per week

Examination Scheme:

Theory Paper : 100 marks (3 hrs. duration)

Term Work : 25 Marks.

Practical and Oral Examination: 25 Marks

SECTION-I

1. Thermodynamic (PVT) relations of working fluids: (7)

Equation of state for ideal gas; behavior of real gases and compressibility factor, Generalized empirical and theoretical equations of state for real gases; Law of corresponding states and use of generalized compressibility chart; Helmoltz and Gibbs functions; Maxwell's relations; Enthalpy, entropy, internal energy, and specific heat relations, Clausis - Clapeyron's equation; Applications to ideal and real gases. Joule Thomson coefficient

2. Entropy (7)

Clausius inequality, entropy as a property of system. entropy of pure substance. T-s and h-s planes, entropy change in a reversible and irreversible processes, increase of entropy principle, calculation of entropy changes of gases and vapours.

Available and unavailable energy: availability of a closed and open system, availability of work and heat reservoirs, Anergy, energy and exergy and simple numericals.

3. Vapour Power Cycles (7)

Carnot cycle using steam, limitations of Carnot cycle, Rankine cycle, representation on T-s and h-s planes, thermal efficiency, specific steam consumption. Work ratio, effect of steam supply pressure and temperature, condenser pressure on the performance. (Numerical Treatment)

SECTION - II

4. Steam Condensers (4)

Steam Condensers: Functions, elements of condensing plant, types of steam condensers, surface and jet condensers, comparison, vacuum efficiency, condenser efficiency, loss of vacuum, sources of air leakages, methods of leak detection, air extraction methods, estimation of cooling water required, capacity of air extraction pump, air ejectors. Cooling towers- Function and types

5. Steam Nozzles (5)

Function, shapes, critical pressure ratio, maximum discharge condition, effect of friction, design of throat and exit areas, nozzle efficiency, velocity coefficient, coefficient of discharge, supersaturated flow, degree of under-cooling and degree of supersaturation, effects of supersaturation.

7. Steam Turbines (7)

Principles of operation, classification, impulse and reaction steam turbine, compounding of steam turbines. Reheat regenerative steam power cycles. Flow through impulse turbine blades, velocity diagrams, work done, efficiencies, end thrust, blade friction, influence of ratio of blade speed to steam speed on efficiency of single and multistage turbines and its condition curve and reheat factors. Flow through impulse reaction blades, velocity diagram, and degree of reaction, parson's reaction turbine, back pressure and pass out turbine. Governing of steam turbines, Turbine troubles.

8. Gas Turbines: (5)

Working principles, applications, open, closed cycle and their comparison, Cycle modified to regeneration, reheat, inter cooling performance, Calculation of gas turbine work ratio, efficiency etc.

Industrial visit to steam power plant to study-

a) Construction details of boilers
b) Boiler mountings & accessories

TERM WORK

The number of students in each group working on a set up shall not exceed 5 students.

1. Test on grease penetrometer and dropping point apparatus
2. Test on redwood viscometer
3. Test on aniline point apparatus
4. Test on carbon residue, cloud and pour point apparatus
5. Test on flash & fire point apparatus
6. Study / demonstration on water tube & fire tube boilers
7. Study / demonstration of boiler mountings & accessories
8. Test on steam calorimeter to find dryness fraction of steam
9. Test on steam condenser to find condenser efficiency
10. Test on steam turbine to find blade efficiency
11. Trial on steam boiler
12. Estimation of calorific value of fuel

Instructions for practical examination

Four to five experiments shall be selected for practical examination.

Four students for each practical set up.

Oral will be based on the practical examination and journal.

BOOKS

1. P.K. Nag, Engineering Thermodynamics, Tata Mc Graw Hill ,New Delhi
2. Kumar and Vasandani, Thermal Engineering, Metropolitan Book Co., Delhi.
3. Mathur and Mehta, Thermal Engineering, Jain Bros. Publishers, Delhi.
4. Ballaney P.L., Thermal Engineering, Khanna Publishers, New Delhi.
5. Holman, Thermodynamics, Mc Graw Hill , London
6. R.S. Khurmi/ J.K.Gupta, A Text Book of Thermal Engg., S. Chand and Company, New Delhi.
7. R. Yadav, Steam & Gas Turbine,
8. S.L. Sumasundram, Thermal Engineering, New Age International.
9. Cengel, Thermodynamics: An engineering approach, 3/e, Tata McGraw-Hill, New Delhi

S.E. (Automobile) PART-I

3. FLUID MECHANICS

Teaching Scheme:

Lectures: 3 hrs/week
Practical: 2 hrs/week

Examination Scheme:

Theory Paper : 100 marks (3 hrs.)
Term work : 25 marks

Practical and Oral: 25 marks

SECTION-I

1. Properties of the Fluids (4)

   Viscosity, compressibility, surface tension and capillarity, vapour pressure & cavitation, static pressure, pressure head, Insensitivity of pressure, Pascal's Law, Absolute gauge, Vaccum, Atmosphere pressures, manometers.

2. Fluid Statics (4)

   Total pressure & C. P. for horizontal, vertical and inclined rectangular, Triangular & Circular plane surface (Without Proof), Buoyancy, centre of Buoyancy, Meta centre, Metacentric Height.

3. Fluid Kinematics (3)

   Flow visualization, types of flow, streamline, path line, streak line, stream tube, continuity equation in Cartesian coordinates in three dimensional form. Acceleration of fluid particles.

4. Fluid Dynamics (7)

   Equation of motion, Integration of Euler's equation as energy equation. Energy correction factor.

   Steady and unsteady flow through orifice. Orifice placed in a pipe, Venturimeter, flow over triangular and rectangular notches.

5. Momentum Equation (3)

   Derivation of momentum equation, momentum correction factor, Applications of momentum equation.

SECTION - II

6. Laminar Flow (3)

Laminar flow through circular pipes, laminar flow through parallel plates.

7. Flow in pipes (5)

Energy losses in transition, expansion and contraction. Parallel pipe, siphon pipes, branching pipes and equivalent pipes. Hydraulic Gradient & Total energy line.

8. Dimensional Analysis and Similitude (2)

Dimensionally homogeneous equations, Buckingham's π theorem, calculation of dimensionless parameters. Similitude, complete similarity, model scales.

9. Boundary Layer Theory (3)

Boundary layer thickness, its characteristics, laminar and turbulent boundary layers, separation, boundary layer control (descriptive treatment)

10. Forces on immersed bodies (3)

Types of drags on a flat plate. Drag on aerofoil. Development of lift. (Magnus effect) stalling condition of aerofoil.

11. Compressible flow (5)

Propagation of elastic waves, Mach number cone, Energy equation of compressible flows, Stagnation pressure and temperature, Adiabatic flow through pipes of varying cross section, Isentropic flow, Condition of maximum discharge.

TERM WORK

The term work shall consist of the report on any ten experiments from the following:

1. Determination of minor losses in pipe-fittings
2. Flow visualization by plotting of streamline (Heleshaw apparatus).
3. Verification of Bernoulli's equation.
4. Orifice under steady and unsteady flow condition and/ or Reynolds experiment.
5. Determination of velocity profile through circular pipes for laminar flow.
6. Determination of loss head and discharge in parallel pipe.
7. Determination of loss of friction in series pipes.
8. Pressure and velocity distribution over aerofoil.
9. Measurement of lift and drag on model in wind tunnel.

10. Calibration of notches.
11. Calibration of Venturimeter and orifice-meter.
12. Determination of coefficient of friction in pipe flow for G. I. and PVC pipes.

Instructions for practical examination

Four to five experiments shall be selected for practical examination.

A group of four students for each practical set up .

Oral will be based on the practical examination and journal.

BOOKS

1. V. L. Streeter and E. B. Wyline, Fluid Mechanics, Wiley Eastel Limited, New Delhi
2. K. L. Kumar, Fluid Mechanics, S. Chand Publication, New Delhi
3. K. Subramanya, Theory and Applications of machines, Tata McGraw Hill Publication.
4. Fox and McDonald, Fluid Mechanics, John Wiley and Sons, New York.
5. Bansal, Fluid Mechanics, Laxmi publications, New Delhi.
6. Fraizini, Fluid Mechanics, 4/e, Tata McGraw-Hill, New Delhi.
7. White, Fluid Mechanics, 4/e, Tata McGraw-Hill, New Delhi.
8. P. N. Modi, S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House, New Delhi.

S.E. (Automobile) PART-I

4. ENGINEERING MATERIALS

Teaching Scheme: Examination Scheme:

Lectures: 3 hrs/week Theory Paper: 100 marks (3 hrs. duration)

SECTION-I

Types of engineering materials

Classification of engineering material, metals, nonmetals, plastics, ceramics, composites and wood (2)

Properties of Engineering Materials

Mechanical properties of engineering materials- creep, fatigue properties of materials, Fatigue failure and endurance limit, modulus of elasticity, yield strength, plastic deformation and toughness, Compressive strength, tensile strength and elongation at break, viscoelasticity, hardness, impact strength. Ductility, Importance of material properties in manufacturing (6)

Structure of materials Crystalline structure of solids: Concept of unit cell and space lattice, Miller indices, Crystal structure determination by X-ray diffraction, Crystal structure of ferrous and non ferrous metals, Crystal imperfections, Structure of non crystalline materials (4)

Plastics and Rubber: Natural rubber- production and properties- Compounding and Vulcanization of Rubber- Synthetic Rubbers - Buna Rubbers, Butyle Rubbers, Neoprene Thiokols, Polyurethane and a Silicons Rubbers. (4)

Polymers: Physical and Mechanical properties of polymers and their composites, effect of processing on properties. Applications in engineering.
(2)

High Polymers : Classification of High polymers- production of high polymers- general methods- Some important plastics, their production, properties and uses- Polyethylene PVC, Polystyrene, Teflon, Acrylics, Nylon, Polyesters, Phenol Formaldehyde Resins, Urea Formaldehyde Resins and silicones-compounding and moulding of High polymers.
(3)

SECTION-II

Ferrous Alloys: Study of Fe-Fe_3C equilibrium diagram with all phases and critical temperatures

i) Steels: plain carbon steels, mild steels, medium carbon structural steels, high carbon tool steel. (4)

ii) Alloy Steels: Effect of alloying elements on physical and mechanical properties of steels, Free cutting steels, high carbon low alloy steels, maraging steels, creep resisting steels, high temperature or super alloys, study of low expansion and controlled expansion alloys; alloys for heating elements, Stainless steels: different types, Tool steels: cold work tool steel, hot work tool steels, high-speed tool steel (HSS), special purpose tool steels. (4)

iii) Cast Irons: factors affecting structures of cast irons, White C.I., malleable C.I., Grey C.I., Mechanite, Nodular C. I. (3)

Engineering Non Ferrous Alloys:

i) Al –based alloys

ii) Cu –based alloys- Different types of Brass and bronze.

iii) Tin based alloys

iv) Introduction to light metal alloys- Mg based and Titanium based alloys (3)

Composite Materials : Introduction, Types of composite materials, properties, advantages, orthotropic and anisotropic behavior, Micromechanical and macro-mechanical analysis of composite material, Applications of composite materials, (4)

Corrosion and its prevention

Dry corrosion, Wet corrosion, Pilling and Bedworth rule, Formation and growth of film, Growth law, Galvanic corrosion, Stress corrosion, Effect of temperature, Corrosion control and prevention methods. (3)

TEXT BOOKS

1. V D Kodgire, Material science and metallurgy, Everest Publishers, Pune
2. Swroop and Saxena, Elements of metallurgy, Rastogi Publications, Meerut.
3. P L Jain, Principles of foundry technology, Tata McGraw-Hill, New Delhi.
4. O. P. Khanna, Foundry technology, Khanna Publishers, New Delhi.
5. P. C. Sharma, Production technology, S. Chand and Company Ltd.,
6. O. P. Khanna, Welding technology, Khanna Publishers, New Delhi.
7. Vijendra Singh, Material science, Standard Publication, standard Publishers, Delhi.
8. Lawrence H. Vanvlack, "Elements of Material Science and Engineering", Addison- Wesley
9. Raghvan, V., "Material Science and Engineering". Prentice Hall of India.
10. Agrawal, B. K., "Introduction to Engineering Materials" Tata McGraw Hill, New Delhi.
11. Avner, Physical Metallurgy, Tata McGraw Hill, New Delhi.
12. R. Jones, Mechanics of composite material,
13. K Caw, Mechanics of composite material,

REFERENCE BOOKS

1. R A Higgins, Engineering metallurgy-PART I /II, Tata McGraw-Hill Book Company, New Delhi.
2. Haine and Rosenthal, Principles of metal casting, Tata McGraw-Hill Book Company, New Delhi.
3. Little, Welding technology, Tata McGraw-Hill Book Company, New Delhi.
4. ASTM Volumes on Welding, casting, forming and material selection
5. Perry's Chemical Engineers handbook

S.E. (Automobile) PART-I

5. ELECTRICAL TECHNOLOGY

Teaching Scheme:	Examination Scheme:
Lectures: 3 hrs/week	Theory Paper : 100 marks (3 hrs. duration)
Practical: 2 hrs/week	Term work : 25 marks

SECTION-I

1. Generation system: (9)

Construction of DC machine, Principal of generation of DC, Essential parts of DC machine, Armature winding, Types of windings: Lap & Wave, EMF equation, Introduction to armature reaction, Commutation, Type of DC generators, Characteristics, Voltage regulation, Condition for self excitation, Causes of failure to built up voltage, Applications of DC generators,

AC generation, Principal of AC generation, Three phase alternator, Construction,

Armature winding, Classification of winding, Voltage regulation, Rating of alternator, Voltage regulator in automotive alternator.

2. Electric Drives: (8)

D.C. motors, Construction and working principle, Types of motors-series, shunt & compound, Motor characteristics and comparison, Speed control methods of series & shunt motors, Electric braking of DC series and shunt motor-plugging and regenerative braking, Faults in DC machines, Trouble shooting in DC motors,

Three phase induction motor- Working principal, Rotating magnetic field, Rotor frequency, Rotor emf, Torque equation, Starting, Maximum and running torque, Torque speed characteristics, Speed control methods,

AC series motor – Construction, Working principal, characteristics, method of speed control,

Calculation of rating of motors based on torque requirement.

3. **Electrical Heating** (4)

Advantages, Types of electric heating, resistance heating-resistance oven, arc heating-direct and indirect furnace, induction heating, dielectric and infrared heating, induction furnaces-direct, vertical and coreless furnaces, High frequency eddy current heating-principal, advantages and applications.

SECTION-II

4. **Power Semiconductor devices and applications** (7)

Power diode-Construction and rating, Half wave and full wave single phase and three phase uncontrolled Rectifier, SCR-Construction, operating characteristics, Rating-voltage rating, current rating, SCR as a switch, FET & MOSFET-Construction operating characteristics and applications, IGBT- Construction, operating characteristics and applications, Speed control of D.C. motors using SCR circuit.

5. **Electrical Measurements** (4)

PMMC-Principle, construction and use, Wattmeter-Construction and use, Digital multi-meter- block diagram and working, LCD, CRO-CRT, block diagram, measurement of voltage & current, XY plotters.

6. **Transducers** (5)

Definition, classification, transducer selection, different types of transducers, strain gauges, RTD, thermistor, thermocouple, LVDT, capacitive transducers, piezoelectric transducer, photovoltaic cell, LDR, pressure transducer, speed measurement using magnetic and photoelectric pickup, IC based Sensor-LM3.

7. **Operational Amplifiers and overview of microprocessor** (4)

Operation amplifier, OPAmp as an adder, substractor, integrator, differentiator, comparator, Introduction to microprocessor based system, Architecture of 8085.

TERM WORK

A) A batch shall report to Electrical Engineering Laboratory and Electronics laboratory in alternate weeks.
B) All experiments must be set simultaneously and the number of students in each group working on a set up shall not exceed 5 students.

Electrical Technology-Any five experiments from the following list.

1) Load test on D.C. Shunt Generator
2) Speed control of D.C. Shunt motor by flux control and armature control method.
3) Load test on D.C. Shunt motor.
4) Load test on D.C. Series motor.
5) Determination of Regulation of alternator.
6) Load test on three phase Induction motor.
7) Measurement of voltage and current by CRO

Electronics-any five experiments from the following list.

1) Characteristics of SCR
2) Study of operational amplifier as adder, and substractor.
3) Operation Amplifier as level detector (Comparator).
4) Speed control of DC motor by 1 Phase fully controlled converter.
5) Study of Displacement measurement using LVDT.
6) Speed measurement using magnetic pick-up.
7) Addition and subtraction of two 8-bit numbers using 8085.

BOOKS

1. B. L. Thereja, Electrical Technology, Volume,
2. H. Partap, Utilisation of electrical energy,
3. Malvino, Electronic Principles 6/e, Tata McGraw Hill, New Delhi
4. Allen Mottershed, Electronic Devices and circuits, PHI, New Delhi.
5. Ramakant Gaikwad, Operational Amplifiers and Linear integrated circuit Technology, S. Chand Company Ltd.
6. A. K. Sawhney, A Course in Electrical and Electronics measurement and Instrumentation, 11/e, Dhanpat Rai & Sons

7. Milman and Halkias, Electronic devices and circuits, Tata McGraw-Hill Book Company, New Delhi
8. R.S. Gaonkar, Microprocessor, Architecture Programming and Applications with 8085A

S.E. (Automobile) PART-I

6. MEASURMENT TECHNIQUES

Teaching Scheme:

Practical : 2 hrs/week

Examination Scheme:

Term Work : 25 marks

Practical/Oral : 25 marks

Term Work

Temperature measurement using Thermocouple, RTD & Thermister

1. Preparation of Thermocouple bit and Calibration
2. Calibration of pressure gauge & vacuum gauge
3. Angular speed measurement
4. Flow Measurement
5. Measurement of force / load using Strain Gauges & calibration of load cell
6. Vibration Measurement and acoustic measurement
7. Experiment on On-Off Temperature Controller
8. Experiment on DC/AC Motor speed control
9. Experiment on various modes of control P, I, D
10. Experiment on various modes of control P + I, P + D,
11. Experiment on various modes of control P + I + D

TEXT BOOK

1. Mechanical Measurements and Control by D. S. Kumar.
2. Mechanical Measurements by Sorihi & Dr. Radhakrishnan.
3. Mechanical Measurements by Beckwith & Buck and Roy D. Marangoni, Narora Publishing House, New Delhi.
4. Automatic Control Engineering by F.H. Raven 5th Edition. McGraw Hill Student Edition)
5. Modern Control Engineering by K. Ogata.
6. Control Engineering by B.C. Kuo.

S.E. (Automobile) PART-I

7. AUTOMOTIVE COMPONENT DRAWING

Teaching Scheme:

Practical : 4 hrs/week

Examination Scheme:

Term Work : 50 marks

Oral : 25 Marks

TERM WORK

Sheet no. 1: Based on BIS conventions

Significance and importance of BIS Conventions, Conventional representation of engineering Materials, all type of gear and assemblies, helical and leaf springs, Internal and external threads, square head, spline shaft, diamond knurling, BIS conventions for sectioning, type of sections, BIS methods of linear and angular dimensioning. Symbolic representation of welds. (First angle method of projection recommended by BIS is to be used)

Sheet no. 2: Based on sketching (Free hand drawing) of various machine components mentioned

Sketches of nut, bolts, square and hexagonal flanged nuts, lock nuts, dome nut, capstan nut, wing nut, castle nut, split pin, square headed bolt, cup headed bolt, T-headed bolt, Rag foundation bolt, stud, washer, Various types of rivets and riveted joints, Various types of keys, Muff coupling, Protected and unprotected flanged coupling, universal coupling, solid and bush bearing, Plumber block (pedestal bearing), foot step bearing, Flat and V-belt pulleys, Fast and loose pulleys, speed cone pulleys, Pipe joint for C.I. Flanged, socket and spigot type pipe joint, Union pipe joint and standard pipe-fitting, First angle method of projection is to be used.

Sheet no. 3: Drawing details and assembly containing maximum twelve parts by taking actual measurement on parts. (Different automotive assemblies should be given to a group of four students.)

Sheet no. 4: Drawing assembly from given drawing of details and entering limits, fits, tolerances, surface finish symbols, geometrical requirements etc.

Sheet no. 5: Sheet based on auxiliary view.

Sheet no. 6: Sheet based on interpenetration of solids.

Interpenetration of prism with prism, prism with cylinder, prism with cone, prism with pyramids. (Prisms and Pyramids limited up to rectangular), cylinder with cylinder, Cone with cylinder. (Minimum three problems)

Note: Theoretical part of above content should be taught by faculty before assigning sheet to students.

S.E. (Automobile) PART-I

8. WORKSHOP PRACTICE -III

Teaching Scheme: Examination Scheme:

Practical : 2 hrs/week Term Work : 50 marks

The load of workshop practice III will be allotted to the teaching staff and will be assisted by workshop staff for completing the jobs.

1. Sand testing for given sand and core sand (2 practicals)
    a) Size analysis, Grain fineness Number
    b) Hardness (mould/core)
    c) Permeability
    d) Moisture percentage
    e) Clay content
    f) Given compressive strength
2. Preparation of mould and non ferrous casting (2 practicals)
3. One job of plain turning, taper turning and knurling operation. (8 practicals)

Term Work: Journal based on experiment number 1 & 2, Two assignment on moulding and casting.

Assessment: 15 marks for job and 10 marks for journal. It is to be done by teaching staff member and will be assisted by respective workshop staff.

S.E. (Automobile) PART-II

1 PROGRAMMING AND COMPUTATIONAL METHODS

Teaching scheme:

Lectures : 3 hrs/week

Practical : 2 hrs/week

Examination Scheme:

Theory Paper : 100 marks

Term Work: 25 marks

SECTION – I

1. C Programming: (7)

Pointer: Concept Expression, Pointer and array, Characteristics string array of pointers,

Function: Function declaration & prototype, Function call by reference, passing array

to function, storage classes in C. C Preprocessor: Introduction, Macro substantiation, File insulation, Compiler Control Directives,

2. Linear Programming – (5)

Introduction, Formulation of problem,

a) Graphical Method

b) Simplex Method, Quality concept.

3. Roots of Equations (4)

Iteration method (Successive approximation method), The Method of Iteration for System of Non-Linear Equations, Lin Barstow's method for complex roots

Roots of polynomials by Muller's method

4. Interpolation (5)

Gauss forward and backward formulae, Bessel's interpolation formula, Laplace - Everett's formula, Lagrange's Interpolation formula, Newton's General Interpolation formula,

SECTION – II

6. Ordinary Differential Equation: (5)

Boundary Value Problems

a) Shooting Method,

b) Finite Difference Method.

Eigen Value Problems:

a) Power Method

b) Polynomial Method

7. Partial Differential Equation (8)

Elliptic Equations-

a) Laplace Equation,

b)Poisson's Equation.

Parabolic equation-

a) One dimensional heat equation

b) Two dimensional heat equation `

Hyperbolic equation – Wave equation

8. Regression Analysis (4)

Principle of least squares

Linear regression (line of regression of x on y and conversely)

Non linear regression (second degree parabolic curve)

Multiple linear regressions

9. Introduction to Finite Element Method (4)

Solution of boundary value problem

Integral formulations for numerical methods, one dimensional element

Applications of FEM for one dimensional stress problems

TERM WORK

A term work shall consist of report on any ten of the following.

1. Two programs on pointer
2. Two programs on Function
3. Program for solution of nonlinear equation by iteration method
4. Program for solution of polynomial by Muller's method
5. Program to implement Bessel's method of interpolation.
6. Program to implement Lagrange' s method of interpolation

7. Solution of Eign value problem by C program
8. Solution of Laplace equation by C program
9. Solution of Heat equation by C program
10. Solution of Wave equation by C program
11. Program to implement list square fit of line regression
12. Program to implement second degree parabolic curve

TEXT BOOKS

1. S.C. Chapra; R.P. Canale; "Numerical Methods for Engineers"; Tata McGraw Hill Publications, New Delhi.
2. B.S. Grewal, "Numerical Methods"; Khanna Publication, New Delhi
3. Balagurusamy, Numerical Methods, Tata McGraw Hill Publications, New Delhi.
4. Manish Goyal "Computer based numerical and statistical techniques" Laxmi Publication.

S.E. (Automobile) PART-II

2 KINEMATICS OF MACHINES

Teaching Scheme:

Lectures : 3 hrs/week

Practical : 2 hrs/week

Examination Scheme:

Theory Paper : 100 marks (3 hrs. duration)

Term work : 25 Marks

SECTION-I

1. Basic Concepts of Mechanism (4)

Links, kinematics pair (lower and higher), kinematics chain, mechanism, inversions of mechanisms, types of constraints, Grubbler's criterion, slider crank chain and its inversions, double slider crank chain and its inversions, four bar chain and its inversions.

2. Velocity and Acceleration in Mechanisms

a) Graphical Method: (7)

Velocity and acceleration diagram for different mechanisms using relative velocity and acceleration method, Corroillis component of acceleration, Klein's construction for slider crank chain, velocity analysis by instantaneous center method for four bar chain and slider crank chain

b) Analytical Method: (2)

Kinematic analysis of slider crank chain

c) Complex Algebra and Vector Algebra Method (3)

Position vector of point, relative position vector, loop closer equation

(No Numerical Treatment)

3. Mechanisms with Lower Pair (5)

Pantograph, exact and approximate straight-line mechanisms, steering gear mechanisms, Hooke's joint

SECTION-II

4. Synthesis of Mechanism

Chebychev method to find precision points, graphical method of position synthesis for four bar chain and slider crank mechanism – two position, three position synthesis. Analytical method of synthesis by least square technique (5)

5. Cams

Types of cams and followers, profiles of cams for specified motion of different followers, specified counter cams, tangent cams, circular arc cam, spring load on the follower, jumping of follower, torque of camshaft (6)

6. Friction (3)

Friction circle, friction in pivot bearings, friction in screws

7. Governors
(4)

Types of governors, Porter and Hartnell governor, controlling force and stability of governor, hunting, sensitivity, isochronisms, governor effort and power, insensitiveness of governors.

8. Belts and Ropes (3)

Types of belt and rope drives, calculation of lengths and power transmitted, belt tension ratio, actual tension in a running belt, centrifugal and initial tension in a belt, sleep and creep of belt.

TERM WORK

A term work shall consist of following.

1) Demonstration of various mechanisms and their inversions.
2) Velocity and acceleration problems by relative velocity and acceleration method
   --3 problems.
3) Verification of ratio of angular displacement of shafts connected by Hooks joint.
4) Synthesis of mechanism. -- 2 problems.
5) Plot of displacement, velocity and acceleration curves for two types of cam-follower.
6) Governor characteristics for Porter governor

7) Governor characteristics for Hartnell governor

TEXT BOOKS

1) Ratan S.S, Theory of Machines, Tata McGraw Hill, New Delhi.
2) Ballany, Theory of Machines, Khanna Publication, New Delhi.
3) V.P.Singh, Theory of Machines, Dhanpat Rai and Sons.
4) Phakatkar, Theory of Machines I and II, Nirali Publication, Pune
5) Sadhu Singh, Theory of Machines, Tata McGraw Hill, New Delhi.

REFERENCE BOOKS

1) Thomas Bevan, Theory of Machines, CBS Publishers, New Delhi.
2) Shigley, Theory of Machines and Mechanism, McGraw Hill, New York.
3) G.S. Rao and R.V. Dukipatti, Theory of Machines and Mechanism, New Age Int. Publications Ltd. New Delhi.
4) Shah and Jadhawani, Theory of Machines, Dhanpat Rai & Sons
5) Abdullah Shariff, Theory of Machines, McGraw Hill, New Delhi.

S.E. (Automobile) PART-II

3. METALLURGY & METAL TREATMENTS

Teaching Scheme:	Examination Scheme:
Lecture : 3 hrs/week	Theory Paper : 100 marks (3 hrs. duration)
Practical : 2 hrs/week	Term work : 25 Marks
	Oral : 25 marks

SECTION-I

1. Metal Alloy Systems: (7)

   a) Metals, metallic bonds, crystal structure (BCC, FCC, HCP only), imperfection in crystals

   b) Alloy formation by crystallization, solidification, cooling curves

   c) Solid solutions and intermediate phases

   d) Phases and phase rule

   e) Construction of equilibrium diagrams from cooling curves, components of different solubility in liquid and solid state. Eutectic, Eutectoid, Peritectic transformations. Lever arm principles, Long and short-range freezing, dendritic structure and coring.

2. Fe- Fe_3C-Ferrous alloys.

   Cu- Sn, Cu- Zn, Cu- Be-Copper alloys

   Al-Si, Al- Cu – Aluminium alloys

   Pb-Sn, Sn-Sb – Other alloys.

Study of phase diagrams with respect to typical compositions, properties and applications such as (5)

3. Selection of materials based on applications. (4)

   Tools, magnets, springs, bearings, Nuclear, Aerospace, Rocket Propulsion and automobile applications

   Specifications – IS, BS, ASTM, DIN, SAE, AISI, ISO

4. Metallurgical Testing (5)

a) Destructive Testing methods:

Tensile, Compressive, Impact, Fatigue, Creep, Hardness etc.

b) Non- Destructive Testing: -

Dye penetrant, magnetic, ultrasonic, Radiography, Eddy Current testing.

SECTION II

5. Principles of Heat Treatment Processes of Steels (5)

a) Transformation of Pearlite into austenite upon heating, Transformation of austenite into Pearlite, Bainite and Martensite on cooling.

b) TTT – Diagram – significance, Effect of alloying elements on TTT diagram and its significance.

c) CCT – Diagrams

6. Heat Treatment Processes
(8)

a) Annealing - Full

- Sub critical

- Spherodising.

b) Normalising

c) Hardening - Quenching Baths.

- Hardening types

d) Tempering – Types, Structural transformations during tempering.

e) Precipitation hardening – stages, common alloys, variables, theories.

f) Surface hardening – Flame and induction

g) Chemical heat treatments – Carburising, nitriding, cyniding, carbonitriding

7. Heat treatment furnaces, controlled atmospheres. Heat treatment defects and remedies (4)

8. Powder Metallurgy of metals, non-metals and composites with respect to flow charts (4)

Stage - Powder manufacturing types

- Mixing/ Blending

- Compaction- types

- Sintering

- Sizing/ impregnation

Flowcharts for – Tool materials, bearings and bushes, electrical contacts, magnets, sintered aluminium products.

TERM – WORK

1) Tensile testing of mild steel. Cast iron, Brass and aluminium.
2) Hardness testing (Rockwell and Brinell) of steel, CI, Brass, and alloy steel.
3) Impact testing: Mild steel, Brass, C.I., Aluminium
4) Demonstration of N.D.T. (Any two of different NDT tests)
5) Macroscopic Examinations such as spark test Sulphur printing.
6) Examination of microstructure of steels.
7) Examination of microstructure of C.I.
8) Examination of microstructure of Non ferrous alloys.
9) Jominy end – quench test for hardenability
10) Observation of various industrial heat treatments processes during industrial visits.

BOOKS

1. Vijendra Singh, Engg. Physical Metallurgy, Standard Publishers, Delhi
2. V.D. Kodgire, Material science and metallurgy, Everest Publishers Pune
3. Avner, Physical Metallurgy, TMH publication.
4. Clerk, Verney, Engineering Metallurgy –.
5. Higgins R. A., Hodder, Engineering Metallurgy I and II, English language Book Society.
6. A.K. Sinha, Powder Metallurgy
7. Rollson, Metallurgy for Engg. Technicians, English language Book Society

8. T.V. Rajan / C.P. Sharma, Heat Treatments Principles and Practices, Prentice Hall of India Pvt. Ltd., New Delhi.

9. Prabhudev, Heat treatment of Steels, HMT Handbook

10. G.E. Dieter, Mechanical Metallurgy, Tata McGraw-Hill, New Delhi.

S.E. (Automobile) PART-II

4. FLUID MACHINES

Teaching scheme :

Lectures : 3 Hrs. per Week

Practical : 2 Hrs/Alternate Week

Examination scheme :

Theory Paper : 100 Marks (3 hrs duration)

Term Work : 25 Marks

Practical Oral : 25 marks

Section – I

1. Introduction to Water Turbines:

Impulse & reaction water turbines, Principle of operation, construction & working of Francis & Kaplan Turbine, Draft tube, velocity triangles, calculation of efficiency, power, discharge etc., Governing of turbine. Performance characteristic of turbines

(7)

2. Centrifugal Pumps:

Working principles, Construction, types, various heads, multistage pumps, velocity triangles, minimum starting speed, cavitation, MPSH and NPSH. Methods of priming calculations of efficiencies, discharge, blade angles, head, power required, impeller dimensions etc., Similarity Principles of centrifugal pumps, Performance characteristic.

(9)

3. Reciprocating Pumps:

Principle, construction, working, gear pumps, vane pumps, types, applications, Air vessels, Performance characteristics. (5)

Section - II

4. Air Compressors:

Application of compressed air, classification of compressor, reciprocating compressors, construction, work input, necessity of cooling, isothermal efficiency, heat rejected, effect of clearance volume, volumetric efficiency, necessity of multistaging, construction, optimum intermediate pressure for minimum work required, after cooler, free air delivered, air flow measurement, capacity control. Roots blower and vane blower (descriptive treatment) (7)

5. Rotodynamic Air Compressors:

Centrifugal compressor, velocity diagram. Theory of operation, losses, Adiabatic efficiency, effect of compressibility, diffuser, prewhirl, pressure coefficient, slip factor, performance.

Axial flow compressors, velocity diagram, degree of reaction, polytropic efficiency, surging, chocking, stalling, performance, comparison with centrifugal. (6)

6. Gas Turbines:

Working principles, applications, open, closed cycle and their comparison, Cycle modified to regeneration, reheat, inter cooling performance, Calculation of gas turbine work ratio, efficiency etc. (6)

7. Jet Propulsions:

Types, construction, working principle, applications. (2)

Term Work

1. Trial on Pelton wheel
2. Trial on Francis turbine
3. Trial on Kaplan turbine
4. Trial on Reciprocating pump
5. Trial on Centrifugal pump
6. Trial on reciprocating compressor
7. Trial on centrifugal blower
8. Study of hydraulic devices- Intensifier, Accumulator
9. Study of hydraulic devices Hydraulic jacks, press, Crane

10. Study of other types of pumps and compressors – Gear pump, jet pump, submersible pump, air lift pump Industrial visit to hydro power plant

References

1. Hydraulic Machines, V.P. Vasantdani
2. Fluid Mechanics and Hydraulic Machines, Modi Seth
3. Fluid flow machines, N.S. Govindrao
4. Turbo machines, S.M. Yahya
5. Fluid power Engineering, D.S. Kumar
6. Steam & gas Turbines, R. Yadav
7. Steam & gas Turbines, V. Ganeshan
8. Thermal Engg. Kumar Vasantdani
9. Thermal Engg. P.L. Balleny
10. Gas turbines & Compressor, Cohen & Rogers
11. Thermodynamics & Heat Engines – Vol-II by R. Yadav

S.E. (Automobile) PART-II

5. STRENGTH OF MATERIALS

Teaching scheme :

Lectures :3 Hrs. per Week

Examination scheme :

Theory Paper :100 Marks (3 hrs duration)

SECTION-I

1. Stresses and Strain. (6)

Concept of stress and strain, (Linear, lateral, shear and volumetric), Hooke's Law, Poisson's ratio, Modulus of Elasticity, Modulus of rigidity, stress-strain diagram for ductile and brittle material, factor of safety, working stress, Complementary shear stress, Bulk Modulus, inter-relationship between elastic constants, Thermal stresses.

2. Principal Stresses and Strains (7)

Normal and shear stresses on any oblique planes, concept of Principal planes, derivation of expression for Principal stresses and maximum shear stress, Positions of principal planes and planes of maximum shear, Graphical solutions using Mohr's circle of stresses,

3. Shear Force and Bending Moment Diagram. (4)

Concept and definition of shear force and bending moment in determinate beams due to concentrated, UDL and uniform varying load.

4. Bending Stresses in Beams (4)

Symmetric pure bending of beams, flexure formula, moment of resistance of cross-sections, simple built-up section, design of rectangular and circular (solid and hollow) sections; L, I and T sections

SECTION II

5. Shear stresses in beam

Distribution of shear stresses in beams of various commonly used sections such as circular, I, T, and L angles, combined effect of bending and shear. (3)

6. Deflection of Beams (5)

Strain curvature and moment curvature relation, solution of beam deflection problem by Double integration method, Area moment method.

7. Columns (3)

Euler's formula for different end connections, concept of equivalent length, eccentric loading, Rankine formula

8. Torsion (3)

Basic assumptions, Torsion formula, Hollow and solid circular shafts, Angular deflection, Combined bending and Torsion,

9. Energy Methods (4)

Strain energy for axial stress, Pure bending and shear stresses, use of energy theorem to determine deflections and twists of shafts

10. Bending of curved Beams (3)

Introduction, stresses in curved beams like hook.

TEXT BOOKS

1. Ferdinand P Beer and E.R. Johnston JR, John Dewolf, Mechanics of Materials 3/e, McGraw Hill Book Company
2. Timoshenko and Young, Elements of Strength of Materials, East-West Press Pvt. Limited, New Delhi.
3. Ramamurthum, Strength of Materials, Dhanpat Rai and Sons, New Delhi.
4. Rajput, Strength of Materials, Laxmi Publication
5. D.R. Malhotra and H.C.Gupta, Strength of Materials, Satya Publication, New Delhi.
6. S.B.Junnerkar, Mechanics of structure Vol I, Publication House,
7. Bansal, Charotor Strength of Materials, Laxmi Publication
8. Khurmi Gupta, Strength of Materials, S. Chand Publication.

REFERENCE BOOKS

1. Den Hartong, Strength of Materials, McGraw Hill, New York.
2. Singer, Strength of Materials, Horper and Bow Publication. New York,
3. H. Burr and John Cheatam, Mechanical Analysis and Design, PHI, New Delhi.
4. Robert Norton, Machine Design, Prentice Hall

S.E. (Automobile) PART-II

6. MANUFACTURING PROCESSES

Teaching scheme: Examination scheme:

Lectures : 3 Hrs. per Week Theory Paper :100 Marks (3 hrs duration)

SECTION –I

1. Importance of casting as manufacturing Process, advantages and disadvantages of Casting processes, foundry layouts (3)
2. Types of patterns & cores, materials and selection criteria for pattern making, pattern allowances, pattern color code, Gates, runners and risers, Moulding sand its types and properties, (5)
3. Moulding processes:

   Types of moulding process, CO_2 moulding, Shell moulding, Investment casting, Moulding machines and core making machines. Gravity and pressure die-casting, Centrifugal casting, Continuous casting (5)

5. Melting and pouring

   Types of fuel fired melting furnaces, Cupola furnace, oil/gas fired furnaces, crucible furnaces, Metallurgical control in furnaces, Metal pouring equipments (3)

6. Cleaning-fettling and inspection of casting, casting defects and remedies Safety-pollution control and mechanization in foundries (3)
7. Ferrous and non ferrous applications in automobiles. (2)

SECTION - II

8. **Lathe: Centre, Capstan and Turret Lathes (4)**

   Working principles, types specifications, principal parts, accessories and attachments, various operations, Introduction to Automates, Working principle and types

9. Drilling & Boring Machine (3)

Upright, radial, Bench drilling machine, drill chucks, various operations, tapping attachments, Horizontal and vertical boring machine, construction and operation, boring tools and bars, boring heads, Jig boring machine.

10. Shaping, Slotting & Planning Machine (2)
Types, Feed mechanism, various operations

11. Milling Machine (5)

Types of milling machines, milling operations, vertical milling attachment for horizontal milling machine.

12. Grinding Machine (5)

Types – cylindrical (external/internal), center less and surface grinder, tool and cutter grinder, Grinding wheels- Abrasives, bonds and bonding processes, grit, grade and structure of wheel, wheel shapes, wheel specifications. Selection of wheel,

13. Broaching Machine (2)

Types of broaching operations, advantages and limitations.

Industrial visit to a ferrous and non-ferrous foundry to study:

a. Cupola, induction furnace – Construction and working.
b. Different moulding and core making methods and processes.

TEXT BOOKS

1. V D Kodgire, Material science and metallurgy, Everest Publishers, Pune
2. Swroop and Saxena, Elements of metallurgy, Rastogi Publications, Meerut.
3. P L Jain, Principles of foundry technology, Tata McGraw-Hill, New Delhi.
4. O. P. Khanna, Foundry technology, Khanna Publishers, New Delhi.
5. P. C. Sharma, Production technology, S. Chand and Company Ltd.,
6. O. P. Khanna, Welding technology, Khanna Publishers, New Delhi.
7. Vijendra Singh, Material science, Standard Publication, standard Publishers, Delhi.

REFERANCE BOOKS

1. R A Higgins, Engineering metallurgy-PART I /II, Tata McGraw-Hill Book Company, New Delhi.
2. Haine and Rosenthal, Principles of metal casting, Tata McGraw-Hill Book Company, New Delhi.
3. Little, Welding technology, Tata McGraw-Hill Book Company, New Delhi.
4. ASTM Volumes on Welding, casting, forming and material selection

S.E. (Automobile) PART-II

7. COMPUTER AIDED DRAFTING

Teaching scheme: Examination scheme:

Practical : 2 Hrs. per week Term work : 25 Marks

Practical oral : 25 Marks

1. Basic command to draw 2- D objects like line, point, circle, arc, ellipse, polygon, polyline, spline etc.
2. Editting: Erase, extension, breaking, fillet, chamfer, trimming, scaling etc.
3. Viewing and other: Zoom pan, mirroring, rotating, moving objects, arrange blocks, offset etc.
4. Hatching of sections.
5. Use of layers in drawing
6. Plotting of drawing.
7. Introduction to 3-D drawing. Elevation, thickness, viewpoint, UCS, paper space etc.

TERM WORK

1. Computer aided drafting of four simple components like engine piston, crankshaft, connecting rod, screw jack, crane hook, tail stock, tool post etc. and print out of the same

2. Drawing of details and assembly containing 6 – 8 component with tolerance, machining symbol etc. and plotting the same on paper of size not less than A-3
3. 3-D drawing of one simple component and printing its 2-D views along with 3 D object drawing.
4. Redraw given production drawing and to interpret it.

Note: Latest computer aided drafting software like Auto CAD and any 3D modeling software are to be used.

Instructions for practical examination

1. *Every student shall be given one problem each.*
2. Oral shall be based on the problem solved in AutoCad and the journal.

BOOKS

1. George Omura, Mastering Auto CAD, BPB Publication.
2. George Omura, ABC's of Auto CAD, BPB Publication.
3. Bethune, Engineering graphic with Auto CAD 2002, Pearson Publication
4. Machine drawing with Auto CAD Goutam Purohit & Goutam Ghosh, Pearson Edition.

S.E. (Automobile) PART-II

8. WORKSHOP PRACTICE -IV

Teaching Scheme:	Examination Scheme:
Practical : 2 hrs/week	Term Work : 25 Marks
	Practical Examination : 25 Marks

A Job consisting following operation with 3 to 5 component (Composite Job) excluding standard and commercial components. Operation like Turning, Boring, Drilling Tapping Threading, Milling, Shapping, Taper turning etc.

1) One job of at least taper turning, external threading and knurling operation with its process sheet.
2) Description on thread manufacturing processes and gear train calculations.
3) Journal Consists of Following:-
   a. Process sheet and tool layout on Capstan /Turret lathe.
   b. Setting of milling machine for gear cutting.

c. Study and demonstration of grinding machine (Surface, cylindrical and center less).

d. Study and demonstration of shaper/planer/slotting machine (mechanisms and stroke).

4) Industrial visit to study other gear manufacturing processes and finishing processes.

Assessment of journal based on above term work and industrial visit report is to be done by the teaching staff member assisted by workshop staff.

[Jobs carry 15 marks and journal carry remaining 10 marks.]

Scheme of Examination: The examination will be on a single piece involving combination of plain turning, taper turning, threading and knurling.

Shivaji University, Kolhapur

Board of Studies in Automobile Engineering

Equivalence of subjects Second Year Automobile Engineering

Sr. No	Old Subject	New Subject
S. E. Auto SEMESTER – III		
1	Electrical Technology and Electronics	Electrical Technology (SE Semester III)
2	Computer programming, C C++	Programming & Computational Methods (SE Semester IV)
3	Materials and Manufacturing Processes	Manufacturing Processes (SE Semester IV)
4	Applied thermodynamics	Engineering Thermodynamics (SE Semester III)
5	Fluid mechanics	Fluid Mechanics (SE Semester III)
6	Machine drawing I	Engineering Materials (SE Semester III)
S. E. Auto SEMESTER – IV		
1	Engineering Mathematics III	Engineering mathematics - III (SE Semester III)
2	**Programming and**	Programming and computational

	computational methods	methods (SE Semester IV)
3	Theory of machines I	Kinematics of Machines (SE Semester II)
4	Analysis of Mechanical Elements	Strength of Materials (SE Semester IV)
5	Metallurgy	Metallurgy & Metal Treatments (SE Semester IV)
6	Machine tools	Manufacturing Processes (SE Semester IV)