

**SWAMI VIVEKANAND UNIVERSITY, SIRONJA,
SAGAR (M.P.)**

SYLLABUS

For

**Swami Vivekanand University, Sironja Sagar
2013-2014**

SCHEME B.TECH AUTO MOBILE SEM-III

SUBJECT CODE	SUBJECT
BT-301	MATHEMATICS - 2
AU-302	MATERIAL SCIENCE
AU-303	ELECTRICAL MACHINE & ELECTRONICS
AU-304	FLUID MECHANICS
AU-305	MANUFACTURING PROCESS-1
AU-306	INDUSRTRIAL DRAFTING
AU-307	SELF STUDY (INTERNAL ASSESMENT)
AU-308	SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

SCHEME OF EXAMINATION

SUBJECT CODE	THEORY				PRACTICAL			CREDIT		TOTAL	TH- THEORY MS- MID SEM TQ- THEORY QUIZ TW- THEORY TERM WORK PR- PRACTICAL LW- LAB WORK PQ- PRACTICAL QUIZ G - GRADE GP- GRADE POINT F\$-ABSENT #-GRACE
	TH	MS	TQ	TW	PR	LW	LQ	TH	PR	MAX	
	MAX MIN	MAX MIN	MAX MIN	MAX MIN	MAX MIN	MAX MIN	MAX MIN				
BT-301	70 22	20 -	10 -	- -	- -	- -	- -	4	-	100	
AU-302	70 22	20 -	10 -	- -	- -	- -	- -	4	-	100	
AU-303	70 22	20 -	10 -	- -	30 9	20 -	- -	4	2	150	
AU-304	70 22	20 -	10 -	- -	30 9	20 -	- -	4	2	150	
AU-305	70 22	20 -	10 -	- -	30 9	20 -	- -	4	2	150	
AU-306	- -	- -	- -	- -	30 9	20 -	- -	-	2	50	
AU-307	- -	- -	- -	- -	- -	- -	50 -	-	2	50	
AU-308	- -	- -	- -	- -	- -	- -	50 -	-	2	50	

Subject Name: Mathematics - 2

Sr.No	Course content
1.	First order ODE: Methods for solving them, homogeneous equations, exactness, methods for finding integrating factors, Linear and Bernoulli's equation.
2.	Higher order ODE: Linear ODEs (generalities) complimentary function as and particular integrals, linear dependence and independence of functions, Wronskians, Abel-Liouville formula, use of a known solution (for reduction of order) method of variation of parameter.
3.	Linear ODEs with constant coefficient and the Cauchy Euler equation. the characteristic polynomial and indicial polynomial, discussion of the case of complex roots and repeated roots, extracting the real form of the solution via Euler's formula $e^{i\theta} = \cos\theta + i\sin\theta$, method of undetermined coefficient for finding the particular integral for special right hand sides. (forcing functions) both for constant coefficient ODEs as well as Cauchy Euler ODEs.
4.	Beta Gamma functions and their basic properties, statement of Euler's reflection formula, duplication formula via beta gamma.
5.	Laplace transforms: Definition of functions of exponential type with examples. Definition of the Laplace transform and its basic properties as well as examples of Laplace transforms of exponential function, polynomials and trigonometric functions. Statement of the Riemann Lebesgue lemma. Finding the inverse transform. Laplace transform of $\frac{d^n y}{dt^n}$ and $t^n y(t)$ Heaviside unit step function and shifting theorems. Convolution and the convolutions theorem. Beta gamma identity. Use of Laplace transform for solving IVP for ODEs and systems of ODEs. Computing certain important integrals via Laplace transforms.
6.	Series solution of ODEs, Illustrative examples as the equations of Legendre, Tchebychev etc., Legendre polynomials, their Orthogonality and completeness.

7.	Ordinary differential equations with regular singular points and the method of Frobenius. Detailed discussion of Bessel's equations and Bessels' functions of first kind only. Basic properties of $J_p(x)$, the recurrence relation between $J_{p-1}(x)$, $J_p(x)$ and $J_{p+1}(x)$. Integral representation of $J_n(x)$ (where n is a non negative integer).
8.	Fourier series and Fourier transforms Basic formulae in Fourier series. Statement of the theorem on pointwise convergence of Fourier series. Parsevals formula (statement only) and Bessel's inequality with examples. Mean convergence of Fourier series. Fourier transforms and its basic properties. Fourier transform of the Gaussian and the Fourier inversion theorem (statement only). Riemann Lebesgue lemma for Fourier series and Fourier transforms (statement only).
9.	Basic partial differential equations of mathematical physics and their origins (vibrating strings, vibrating membranes heat conduction in solids etc.). Solving PDEs via the method of separation of variables. The Laplace operator in cylindrical and spherical polar coordinates. Brief discussion of Fourier Bessel series. Solution via Fourier series/Fourier-Bessel series for rectangular and circular domains in R^2 and spherical and cylindrical domains in R^3 .

Reference Books:

1. E.Kreyszig, Advanced engineering mathematics (8th Edition), John Wiley (1999).
2. W. E. Boyce and R. DiPrima, Elementary Differential Equations (8th Edition), John Wiley (2005).
3. R. V. Churchill and J. W. Brown, Fourier series and boundary value problems (7th Edition), McGraw-Hill (2006).
4. T.M.Apostol, Calculus , Volume-2 (2nd Edition), Wiley Eastern , 1980

SWAMI VIVEKANAND UNIVERSITY-SAGAR

Subject Name MATERIAL SCIENCE

Sr.No	Course content
1.	Introduction to Material Science and Metallurgy: Classification of Engineering Materials, Engineering requirements of materials, Properties of engineering materials, Criteria for selection of materials for engineering applications.
2.	Metallic Materials: Types, properties and applications, Structure of Metals, Fracture, Macro-examination, Spark Test, Sculptures Print, Macro-etching, Microscopic examinations, Magnetic Testing, Chemical analysis of steel and iron for Carbon, Sulphur & Phosphorous.
3.	Iron-Carbon diagram, plain carbon steels, Allotropy of iron.
4.	Crystallization of metals, Solidification of an alloy, solid solution types. Thermal Equilibrium diagrams of binary alloys. Effects of Structure on Physical Properties.
5.	Cast Iron: Grades, Alloy Cast Iron, Malleable Iron, S. G. Iron.
6.	Wrought Iron: Properties and uses.
7.	Steel: Classification of Steels, Properties and uses, Effects of alloying metals.
8.	Heat Treatment of Steels: Study of Heat-Treatment processes such as Normalizing, Annealing, spheroidizing, hardening, tempering, austempering, martempering, case-hardening, nitriding, cyaniding, induction hardening, flame-hardening, ageing. Application of above processes in mechanical components such as gears, bearing, turbine blades, crankshafts, pistons, cutting tool materials also.

9.	Non-ferrous alloys: alloys of copper, aluminium, magnesium titanium. Other alloys of lead, tin, zinc, nickel, manganese, white metals and bearing alloys.
10.	Powder Metallurgy: Application and advantages, Production of powder, Compacting, Sintering, Equipment and process capability.
11.	Corrosion of metals: meaning, causes and nature. Measures of counter-acting corrosion, Metal coatings, Organic coatings, Lining and cladding, Use of Corrosion inhibitors, Cathodic protection against corrosion.
12.	Non-destructive testing such as Radiography Testing, Dye Penetration Testing, Magnetic Particle Testing, Ultrasonic Testing, and Jominy end-quench test.

Reference Books:

1. Engineering Metallurgy and material science by S. P. Nayak.
2. Materials and Metallurgy by G. B. S. Narang and K. Manchanedy
3. Elements of Metallurgy by Dr. Swaroop and Dr. Saxena.
4. Material science and manufacturing processs by Dharmendrakumar and S. K. Jain.
5. Physical Metallurgy by Robert Read
6. Metallurgy for engineers by V. Raghvan
7. Metallurgy for engineers by Bava.
8. Physical metallurgy by Rollason.
9. Physical metallurgy by Hyegins.
10. Tool steel by Rabert.
11. Material Science by Annver.
12. Material Science by O.P. Khanna.

Subject Name Electrical Machines and Electronics

Sr.No	Course content
1.	Generating equipments: Classification, 2 wire DC generators, working principle of generator, construction of DC Machines, open circuit characteristic, external characteristic and internal characteristic of DC generator.
2.	DC Motors: construction, Types, Principle of operation, torque equation, losses and efficiency, speed torque characteristics of shunt, series and compound motor, D.C. shunt motor starter , speed control of D.C. shunt and series motors.
3.	3-Phase induction motor: Construction, production of rotating magnetic field, principle of operation, speed and slip, rotor current , relation between rotor copper loss and rotor input, torque of an induction motor, torque slip curve, Losses and Efficiency, starters for 3 phase induction motor, speed control.
4.	Single phase induction motor: Production of magnetic field, comparison between three phase & single phase Induction motors, starting of single phase induction motor by capacitor and shaded pole motor, Universal motors.
5.	Alternator: Introduction, construction, details, exciters, alternator operation on load, voltage regulation, losses & efficiency, parallel operation of alternators, synchronizing procedure of alternators, cooling of alternators.
6.	Transformers: General aspects, Basic definition, working principle of transformer, Types of transformers, Transformer construction: core/ shell/ spiral transformers, Transformers windings terminals, tapping, bushing, transformers cooling, oil conservators and breather, 3-phase transformer, Instrument transformers.
7.	Supply systems: Electric Supply system, typical A.C power supply system, comparison of D.C and A.C transmission, Advantages of high transmission voltage, various systems of power transmission, and comparison of conductor material in overhead system, economic choice of transmission voltage.

8.	Tariffs and Power Factor Improvement: Types of Tariffs, Energy bill calculations, disadvantages of low power factor, causes of low power factor, power factor improvement, calculation of power factor correction, importance of power factor improvement, most economical power factor
9.	Substation: Classification of substations, comparison of indoor and out door substations, Transformer substation, pole mounted substations, underground substations, symbols for equipments in substations, Equipment in a transformer substation, bus bar arrangements in substations, key diagram of 66/11 kV substation, key diagram of 11 kv/400 V indoor substation
10.	Diode, Transistor and OPAMP Circuits: Half wave rectifier circuits, Full wave rectifier, Full wave bridge rectifier, Three phase bridge rectifier, Common Emitter amplifier, Multistage amplifier, Symbol and pin diagram of IC 741 OPAMP, OPAMP circuits – Inverting, Non-inverting, Differential, Comparator
11.	Logic Gates and Boolean algebra: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR and their truth tables), Laws of Boolean algebra, De-Morgan's theorem
12.	Introduction to 8085 microprocessor: Architecture of 8085 microprocessor, Pin diagram, Data transfer instructions, Arithmetic instructions, I/O interfacing

Reference Books:

1. A Text book of Power Plant Engineering by R. K Rajput, Laxmi publications
2. Principles of power systems by V.K. Mehta, S.Chand publication, 4th edition
3. Electrical Technology- Vol. II, by B.L.Theraja
4. Industrial Electronics by Bishwanath Paul -PHI Publication

Subject Name Fluid Mechanics

Sr.No	Course content
1.	<p>Fluids and Their Properties: Fluids, Shear stress in a moving fluid, Difference between solid and fluid, Newtonian and Non-Newtonian Fluid, Liquids and Gases, Molecular structure of material, the continuum concept of a fluid, density, viscosity, causes of viscosity in gases, causes of viscosity in a liquid, Surface tension, capillary, vapor pressure, cavitation, compressibility and the bulk modulus, Equation of states of a gas constant, Specific heats of a gas, Expansion of a gas.</p>
2.	<p>Pressures and Head: Static's of a fluid system, pressure, Pascal's law of pressure at a point, variation of pressure vertically in a fluid under gravity, equality of pressure at the same level in a static fluid, general equation for the variation of pressure due to gravity from a point to point in a static fluid, pressure and head, the hydrostatic paradox, pressure measurements by manometers, forced vortex</p>
3.	<p>Static Forces on Surface and Buoyancy: Action of fluid pressure on surface, resultant force and center of pressure on a plane surface under uniform pressure, resultant force and center of pressure on a plane surface immersed in a liquid, pressure diagrams, forces on a curved surface due to hydrostatic pressure, buoyancy, equilibrium of floating bodies, stability of a submerged body, stability of floating bodies, determination of the metacentric height, determination of the position of the metacentre relative to the center of buoyancy, periodic time of oscillation.</p>
4.	<p>Motion of Fluid Particles and Streams: Fluid flow, different types of flow, frames of reference, real and ideal fluids, analyzing fluid flow, motion of a fluid particle, acceleration of a fluid particle, discharge and mean velocity, continuity of flow, continuity equations for 2-D and 3-D flow in Cartesian coordinates of system.</p>
5.	<p>The Energy Equation and its Application: Momentum and fluid flow, Momentum equation for 2-D and 3-D flow along a stream line, momentum correction factor, Euler's equation of motion along a stream line, Mechanical energy of a flowing fluid – Bernoulli's theorem, kinetic energy correction factor, pitot tube, determination of volumetric flow rate via pitot tube, changes of pressure in tapering pipe, principle of venturi meter, pipe orifices, Limitation on the velocity of flow in a pipeline, theory of small orifices discharging to atmosphere, theory of large orifices, Elementary theory of notches and weirs, flow in a curved path, pressure gradient and change of total energy across the streamlines.</p>

6.	Two-Dimensional Ideal Fluid Flow: Rotational and ir-rotational flow, circulation and vorticity, streamlines and the stream functions, velocity potential and potential flow, relation between stream function and velocity potential; flow nets, stream function and velocity potential for uniform flow, vortex flow.
7.	Dimensional Analysis And Similarities: Dimensional analysis, dimensions and units, dimension reasoning, dimensional quantities, Fundamental and derived units and dimensions, dimensions of derivative and integrals, use of dimensional reasoning to check calculations, units of derived quantities, conversion from one system of unit to another, conversion of dimensional constants, dimensional homogeneity, dimensional analysis using the indicial method- Rayleigh's method, dimensional analysis using group method-Buckingham Π theorem, significance of dimensionless group, use of dimensionless groups in experimental investigation, geometric similarity, dynamic similarity, Kinematic similarity, Model testing-Model laws, Undistorted and Distorted models.
8.	Viscous Flow: Reynolds number and Reynolds experiment, flow of viscous fluid through circular pipe-HAGEN-POISEVILLE LAW, Flow of viscous fluid between two parallel fixed plates, power absorbed in viscous flow through - journal ,Foot step and Collar bearing , Movement of piston in dash pot, Methods of Measurement of viscosity.
9.	Compressible Fluid Flow : Basic Thermodynamic relations, Basic thermodynamic processes, Basic equations for one dimensional compression, stagnation properties, pressure wave propagation and sound velocity, Flow through nozzles.
10.	Turbulent Flow: Characteristics of diff. types of flow, expression for coefficient of friction - Darcy Weichback Equation, moody diagram resistance of smooth and rough pipes shear stress and velocity distribution in turbulent flow through pipes.

Reference Books:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, S.K.Kataria & Sons
2. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Prakashan
3. Fluid Mechanics and Hydraulic Machines by R.K. Rajput , S.Chand & Co.
4. Theory and Applications of Fluid Mechanics by K.Subramanya, TMH outline series, Tata McGraw Hill Publishing Company Ltd.
5. Fluid Mechanics by Frank .M. White, McGraw Hill Publishing Company Ltd.
6. Mechanics of Fluids by Shames, McGraw Hill Publishing Company Ltd.

Subject Name Manufacturing Processes - I

Sr.No	Course content
1.	Basic Machine Tools: Machine tools classification, working and auxiliary motions in machine tools, Primary cutting motions in machines tools.
2.	Metal Cutting Lathes: Engine Lathes, construction all arrangement and principal units of engine lathes, type and size range of engine lathes, Operations carried on engine lathe , attachment extending the processing capacities of engine lathes, description of other types of lathes, Plain truing lathes, facing lathes, multiple tool lathes, simple purpose lathes, turret lathes, horizontal and vertical. Alignment tests of lathes.
3.	Drilling Machines: Purpose and field of application of drilling machines upright drill processes, radial drills, alignment tests of drilling machine.
4.	Boring Machine: Purpose and filed of application, Horizontal boring machines, Precision boring machines.
5.	Milling Machines: Purpose and types of milling machines, general purpose milling machines, different types of milling operations, milling cutters, attachments extending the processing capabilities of general purpose milling machines. Alignment tests of milling machine.
6.	Planers, Shapers and Slotters: Classification: Attachments extending the processing capacities of each.
7.	Sawing and broaching, Machines: Metal sawing classification: reciprocating sawing machines, circular sawing machines, band sawing machines. Types of broaching machines, advantage and limitations of broaching.
8.	Grinding Machines and Abrasives: Classification of grinding machines, cylindrical grinders, internal grinders, Surface grinders, tool and cutter grinders, grinding wheel surface finishing. Abrasives, manufacture or grinding wheels.

Reference Books:

1. Workshop Technology Vol. II by Hajra & Choudhari.
2. Manufacturing Processes by O.P. Khanna.
3. Workshop Technology Vol. I & II & III by Chapman.
4. Production Technology by R. K. Jain.
5. Processes and Materials of Manufacture; Lindberg Roy A.; Prentice-Hall India
6. Manufacturing Engineering and Technology; Kalpakjian; Addison-Wesley Publishing Co

Subject Name Industrial Drafting

PART A

Sr.No	Course content
1.	Design consideration of Machine Parts: Definition and understanding of various types of design, Morphology of design, Design procedure, , Selection of materials, Properties and I.S. coding of various materials, factors of safety, Stress Concentration and methods of relieving stresses, Types of stresses-tensile, compressive, shear, bending, bearing, crushing, Eccentric axial stresses, principle stress, Residual stresses,
2.	Design of Fasteners: a)Design of Riveted Joints: Types of riveted joints, design of double and triple riveted butt joints with equal and unequal cover plates, Design of Circumferential joint, Longitudinal Butt Joint, Eccentric loading. b) Welded Joints Types of welded joints, stresses in welded joints, Design for various loading conditions in torsion, shear, or direct load, eccentrically loaded welded joints, welding symbols. c) Miscellaneous Joints: Design of Gibb and cotter, and knuckle joint, Design of Spigot and socket Joint, Design of Turn buckle.
3.	Design of Shaft: Design of solid and hollow shaft for transmission of torque, bending moment and axial forces, Design of shaft for critical speed, design of shaft for rigidity and stiffness, flexible shafts.
4.	Keys and Couplings: Design of different types of keys, design of a muff and clamp coupling, Rigid coupling, Flange Coupling, Flexible coupling- Oldham, universal coupling.
5.	Power Screws: Types of power screw threads, design of screw with different types of threads used in practice, Design of nuts, Design of C clamp, Screw jack, toggle jack, design of coupler.
6.	Levers: General Procedure for design of levers, design of lever for safety valve, design of bell crank lever, design of rocker arm for exhaust valves.

PART B (Industrial Drafting)

Sr.No	Course content
1.	<p>Assembly Drawings: Drawings of assembled view for the part drawings of the following using propionate dimensions.</p> <p>a) Engine parts – cylinder, liners, piston, connecting rod, crank shaft, stuffing boxes, cross heads, Eccentrics. b) Machine parts - Screws jacks, Machine Vices, Plummer block, Tailstock. c) Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock</p>
2.	<p>Production drawing: Elements of production drawing, Fits and tolerance, allocation of fits for various mating parts, tolerance data sheet, and tolerance table preparation Geometric tolerance.</p>
3.	<p>Surface roughness: Roughness and Machining symbols, indication on drawings.</p>

PART C (AutoCAD)

Sr.No	Course content
1.	<p>Introduction to Auto CAD: Starting with AutoCAD, AutoCAD dialog boxes, Co-ordinate Systems, drawing lines, circle, arcs, rectangle, ellipse, polygons, etc.</p>
2.	<p>Editing sketched objects: Editing sketches, moving, copying, pasting, offsetting, scaling, chamfering, trimming, mirroring. Filletting, sketched objects.</p>
3.	<p>Basic dimensioning: Geometric dimensioning and Tolerance: Dimensioning AutoCAD, Creating linear, rotated, angular aligned base line Dimensions, Modifying dimensions.</p>
4.	<p>Creating and modifying 3D objects using AutoCAD.</p>
5.	<p>Plotting the drawings in AutoCAD, plotting drawing using the plot dialog box, adding plotters and using plot styles, plotting sheets.</p>

Reference Books:

1. P.C Sharma and D. K. Aggarwal “ Machine Design”, S.K. Kataria & Sons 2009
2. V. B. Bhandari “Design of Machine Elements”, Tata McGraw Hill Publishing Co.
3. S. G. Kulkarni, “Machine Design - Solved Problems", Tata McGraw Hill Publishing Company Ltd., New Delhi
4. William Orthein, "Machine Component Design (Vol. I & II)", M/s. Jaico Publishing
5. N.D. Bhatt, “Machine Drawing” –Charator Publication
6. P.S. Gill, Machine Drawing by S.K. Kataria & Sons New Delhi
7. Joseph Edward Shigley and Charles R. Mischke, "Mechanical Engineering Design", McGraw Hill International Edition,
8. Sham Tickoo, AutoCAD 2009 CENGAGE learning Indian Edition
9. P.J Shah, “Machine Drawing”, S.Chand Publication
10. Machine Design by Shigley Tata McGraw hill