



B. Tech. in Automobile Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTMA101		APPLIED MATHEMATICS I	60	20	20	0	0	3	1	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

To introduce the students with the (A) Fundamentals of the Differential, Integral, Vector Calculus and Numerical Analysis.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes students will be able to:

1. Understand and apply the basics of the differential calculus.
2. Know the fundamental principles of the integral calculus and apply them.
3. Apply the techniques in the numerical analysis.
4. Know the numerical solution of the system of linear algebraic equations.
5. Understand and apply the basics of the vector calculus.

Syllabus

Unit-I

Differential Calculus: Limits of functions, continuous functions, uniform continuity, monotone and inverse functions. Differentiable functions, Rolle's Theorem, mean value theorems and Taylor's theorem, power series. Functions of several variables, partial derivatives, chain rule, Tangent planes and normal. Maxima, minima, saddle points, Lagrange multipliers, exact differentials.

Unit – II

Integral Calculus: Riemann integration, fundamental theorem of integral calculus, improper integrals. Application to length, area, volume, surface area of revolution. Multiple integrals with application to volume, surface area, Change of variables.

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Unit – III

Numerical Analysis: Number Representation and Errors: Numerical Errors; Floating Point Representation; Finite Single and Double Precision Differences; Machine Epsilon; Significant Digits.

Numerical Methods for Solving Nonlinear Equations: Method of Bisection, Secant Method, False Position, Newton-Raphson's Method, Multidimensional Newton's Method, Fixed Point Method and their convergence.

Unit – IV

Numerical Analysis: Numerical Methods for Solving System of Linear Equations: Norms; Condition Numbers, Forward Gaussian Elimination and Backward Substitution; Gauss-Jordan Elimination; FGE with Partial Pivoting and Row Scaling; LU Decomposition; Iterative Methods: Jacobi, Gauss Siedal; Power method and QR method for Eigen Value and Eigen vector.

Unit – V

Vector Calculus: Gradient and directional derivative. Divergence and Curl of Vector point Function, line and surface integrals. Green's, Gauss' and Stokes' theorems and their applications.

Reference Books:

1. "Calculus", by T. M. Apostol, Volume I, 2nd Ed, Wiley, 1967.
 2. "Calculus", by T. M. Apostol, Volume II, 2nd Ed, Wiley, 1969.
 3. "Numerical Analysis", by K. E. Atkinson, John Wiley, Low Price Edition (2004).
 4. "Elementary Numerical Analysis - An Algorithmic Approach", by S. D. Conte and C. de Boor, McGraw-Hill, 2005.
 5. "Higher Engineering Mathematics", by B. S. Grewal, Khanna Publishers, Delhi
 6. "Early Transcendental", by J. Stewart, Calculus: 5th Ed, Thomas Learning (Brooks/ Cole), Indian Reprint, 2003.
1. S. C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists


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B. Tech. in Automobile Engineering (Revised Syllabus)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESMENT	END SEM UNIVERSITY EXAM	TEACHER ASSESMENT*				
BTPH 101		APPLIED PHYSICS	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

1. To develop the comprehensive understanding of laws of physics.
2. To develop ability to apply laws of physics for various engineering applications.
3. To develop the experimental skills, ability to analyze the data obtained experimentally to reach substantiated conclusions.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Student will be able to comprehend laws of physics.
2. Student will be able to apply laws of physics for various engineering applications.
3. Student will be able to determine physical parameter experimentally and will be able to analyze the data obtained experimentally to draw substantiate conclusions.

Syllabus

Unit - I

Quantum Physics: Introduction to Quantum hypothesis, Matter wave concept, Wave Group and Particle velocity and their relations, Uncertainty principle with elementary proof and applications to microscope and single slit, Compton Effect, Wave function and its physical significance. Development of time dependent and time independent Schrodinger wave equation, Applications of time independent Schrodinger wave equation.

Unit - II

Solid State Physics: Free electron model, Qualitative Analysis of Kronig Penney Model, Effective mass, Fermi level for Intrinsic and Extrinsic semiconductors, P-N junction diode, Zener diode, Tunnel diode, Photodiode, Solar-cells, Hall Effect, Introduction to Superconductivity, Meissner effect, Type I & II Superconductors.

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Unit - III

Nuclear Physics: Nuclear Structure & Properties Nuclear models: Liquid drop with semi-empirical mass formula & shell model. Particle accelerators: Cyclotron, Synchrotron, Betatron. Counters and Detectors: Giger-Muller counters, Bainbridge Mass Spectrograph and Auston Mass Spectrograph.

Unit - IV

Laser & Fiber Optics: Stimulated and Spontaneous Emission, Einstein's A&B Coefficients, Population Inversion, Pumping, Techniques of Pumping, Optical Resonator, Properties and Applications of Laser, Ruby, Nd:YAG, He-Ne lasers. Introduction to Optical fibre, Acceptance angle and cone, Numerical Aperture, V- Number, Ray theory of propagation through optical fibre, Pulse dispersion, applications of optical fibre.

Unit-V

Wave Optics: Introduction to Interference, Fresnel's Bi-prism, Interference in Thin films, Newton's rings experiment, Michelson's interferometer and its application, Introduction to Diffraction and its Types, Diffraction at single slit, double slit, resolving power, Rayleigh criterion, Resolving power of grating, Concept of polarized light, Double refraction, quarter and half wave plate, circularly & elliptically polarized light.

Reference Books:

1. "Engineering Physics", by Dr. S. L. Gupta and Sanjeev Gupta, Dhanpat Rai Publication, New Delhi.
2. "Engineering Physics", by Navneet Gupta, Dhanpat Rai Publication, New Delhi.
3. "Engineering Physics", by H. J. Sawant, Technical Publications, Pune, Maharashtra.
4. "Engineering Physics", by M.N. Avdhanulu & P.G. Kshirsagar, S.Chand & Co.Edition (2010).
5. "Fundamentals of Physics", by Halliday, Wiley, India.
6. "Concepts of Modern Physics", by Beiser, TMH, New Delhi.
7. "Atomic and Nuclear physics", by Brijlal and Subraminiyan.
8. "LASERSs and Electro Optics", by Christopher C. Davis, Cambridge Univ. Press (1996).
9. "Optoelectronics an Introduction", by J. Wilson & J.F.B.Hawkes, "" Prentice-Hall II Edition.
10. "LASER theory and applications", by A. K. Ghatak & Tyagarajan, TMH (1984).

List of Experiments

1. Measurement of radius of curvature "R" of convex lens by Newton's ring experiment.
2. Measurement of Numerical aperture of fiber by LASER.
3. Determination of Energy band gap „Eg“ of Ge using Four Probe method.
4. Measurement of Frequency of A.C. mains by electrically maintained vibrating rod.
5. Measurement of Resolving Power of Telescope.
6. Measurement of "λ" of LASER light source using Diffraction Grating.
7. Determination of Planck's constant by using photocell.

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8. Determination of Energy band gap (E_g) using PN Junction Diode.
9. To determine the mass of cane sugar dissolved in water using half shade polarimeter.
10. To study forward and reverse characteristics of Zener diode.
11. To study forward and reverse characteristics of P-N diode.
12. To study characteristics of Photo diode.
13. To study characteristics of LDR.
14. μ and ω of given prism using spectrometer.
15. Measuring height of a given object using Sextant.


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B. Tech. in Automobile Engineering

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTEE102		FUNDAMENTALS OF ELECTRICAL ENGINEERING	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A) To impart the basic knowledge about the Electric and Magnetic circuits. (B) To explain the working principle, construction, applications of DC machines, AC machines.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

Students will be able to:

1. Understand and Analyze basic circuit concepts.
2. Apply knowledge of mathematics to analyze and solve electrical circuit problems.
3. Understand the AC fundamentals.
4. Illustrate basic knowledge about the Electric and Magnetic circuits.
5. Distinguish the working Principles of various Electrical Machines.

Syllabus

Unit - I

Electrical Circuit Analysis: Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit. Kirchoff’s law. Voltage and current sources, dependent and independent sources, source conversion, DC circuit’s analysis using mesh & nodal method, Thevenin’s theorem, Norton’s theorem, Superposition theorem, star-delta transformation.

Unit - II

Ac Fundamentals: Production of alternating voltage, waveforms, average and RMS values, peak factor, form factor, phase and phase difference, phasor representation of alternating quantities, phasor diagram, behavior of AC series, parallel and series parallel circuits, power factor, power in AC circuit, 1-phase AC circuits under sinusoidal steady state, active, reactive and apparent power, physical meaning of reactive power, power factor, 3-phase balanced and Unbalanced supply, star and delta connections.

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Unit - III

Electromagnetism: Biot-savart law, Ampere's circuital law, field calculation using Biot-savart and ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faradays' law, self and mutual inductance. Energy stored in a magnetic field, Hysteretic and Eddy current losses. Electro-mechanical energy conversion.

Unit - IV

Transformers: Review of laws of electromagnetism, mmf, flux, and their relation, analysis of magnetic circuits. Single-phase transformer, basic concepts and construction features, voltage, current and impedance transformation, equivalent circuits, phasor diagram, voltage regulation, losses and efficiency, OC and SC test.

Unit - V

Basic Concepts of Rotating Electric Machines: Constructional details of DC machine, Basic concepts of winding (Lap and wave). Principle of operation, EMF equation, characteristics (open circuit, load). DC motors: Principle of operation, Speed-torque Characteristics (shunt and series machine), starting (by 3-point starter), Speed control (armature voltage and field control). Induction machine and Synchronous machine, Working principle of 3-Phase Induction motor, EMF equation of 3-Phase induction motor, Concept of slip in 3-Phase induction motor, Explanation of Torque-slip characteristics of 3-Phase induction motor. Principle of operation of Synchronous Machine.

Reference Books:

1. "Basic Electrical engineering", by D.P Kothari & I.J Nagrath, TMH, Second Edition.
2. "Basic Electrical Engineering", by V.N Mittle & Arvind Mittal, TMH, Second Edition.
3. "Electrical Engineering Fundamental", by Vincent. Toro, Pearson Education, Second Edition.

List of Experiments

1. Verification of KCL and KVL Law's.
2. Separation of resistance and inductance of choke coil.
3. Study of Transformer, name plate rating.
4. Determination of Turns ratio and polarity of Single Phase Transformer.
5. Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests.
6. Measurement of power in a three phase circuit by two wattmeter method.
7. Measurement of power in a three phase circuit by three wattmeter method
8. Measurement of various line & phase quantities for a 3-phase circuit.
9. Study of No load characteristics of D.C shunt Generators.
10. Study of comparative features of Synchronous Machine and Induction Machine.


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B. Tech. in Automobile Engineering

Table with columns: SUBJECT CODE, Category, SUBJECT NAME, and TEACHING & EVALUATION SCHEME (THEORY, PRACTICAL, L, T, P, CREDITS). Row 1: BTCE101, FUNDAMENTALS OF CIVIL ENGINEERING, 60, 20, 20, 30, 20, 3, 1, 2, 5.

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

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Course Educational Objectives (CEOs):

The Students (A) Will Be Able to identify various civil engineering aspects(B)with emphasis on civil engineering materials, various surveys and major structures in civil engineering (C)efficiently & effectively.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes students will be able to:

- 1. Understand and identify various building materials
2. Perform various surveys required to carry civil engineering work
3. Identify various aspects of remote sensing.
4. Get knowledge about various aspects of roads and dams.

Syllabus

Unit - I

Building Materials & Construction: Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

Unit – II

Surveying & Positioning: Introduction to surveying Instruments levels, theodolites, plane tables and related devices. Electronic surveying instruments etc. Measurement of distances- conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.

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Unit – III

Mapping & Sensing:

Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing and its applications.

Unit – IV

Roads: Types of Roads, Nagpur Road Plan, Components of Road and their function; Bridges: Important parts of bridges, classification of bridges; Types of Dams.

Unit – V

Overview of Indian Road Congress, National Highway Authority of India (NHAI) and American Society of Civil Engineers (ASCE), Emerging areas and new technologies in the field of civil engineering.

Reference Books:

1. *“Basic Civil Engineering”, by S. Ramamrutam & R. Narayanan; Dhanpat Rai Pub.*
2. *“Surveying”, by Punmia, B.C., Standard book depot.*
3. *“Surveying”, by Duggal – Tata McGraw Hill New Delhi.*
4. *“Building Construction”, by S.C. Rangwala- Charotar publications House, Anand.*
5. *“Building Construction”, by Grucharan Singh- Standard Book House, New Delhi*

List of Experiments

1. To perform traverse surveying with prismatic compass, check for local attraction and determine corrected bearings and to balance the traverse by Bowditch’s rule.
2. To perform levelling exercise by height of instrument of Rise and fall method.
3. To measure horizontal and vertical angles in the field by using Theodolite.
4. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
5. To determine the workability of fresh concrete of given proportions by slump test or compaction factor test.
6. To determine the Compressive Strength of brick.
7. To determine particle size distribution and fineness modulus of coarse and fine Aggregate.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTME101		ENGINEERING DRAWING	60	20	20	30	20	3	0	4	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

To familiarize with concepts of (A) scale, conic sections and engineering curves (B) projections of points and line in all quadrants; (C) construction of geometrical figures & solids, with its orientation on horizontal and vertical planes, and its projection; section of solid, (D) development of solid and isometric projection view.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Student would be able to draw scale, conic sections and engineering curves.
2. Student would be able to draw projection of point and line; identify the use of these concepts in practical life.
3. Students would be able to understand plain & 3D model at various orientations and draw their projection.
4. Student would be able to draw the projections of with and without sectioning of solid models and surface development.
5. Students would be able to understand the difference between orthographic view and isometric projections.

Syllabus

Unit - I

Scales, Conic Section & Engineering Curves Scales: Representative Factor, types of scales, principle and construction of different scales

Conic Section: Construction of ellipse, parabola and hyperbola by different methods; Normal and Tangent

Engineering Curves: Cycloid, Epicycloids, Hyper cycloid, Involute, Archimedean and Logarithmic spirals.

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Unit - II

Projection of Points & Line Projection: Introduction to projection, Types of projection, terminology, first angle and third angle

Projection of Points: Introduction of point, conventional representation

Projection of Lines: Introduction of straight line, orientation of straight line, true inclination and true length, concepts of end projectors, plan and traces and auxiliary planes

Unit - III

Projections of Planes: Introduction of planes, types of planes, orientation of planes, projection of planes in different positions, traces of planes

Projection of Solids: Introduction of solids, classification of solids, recommended naming of corners of solids, orientation of solids

Unit - IV

Section of Solids & Development of Surfaces Section of Solids: Introduction of section of solids, terminology, types of section planes, section of prisms, section of pyramid and section of composite solids

Development of Surfaces: Introduction of development of surfaces, classification of surfaces, methods of development, development of prisms, pyramids, cylinder and cone, anti-development

Unit - V

Isometric Projections: Introduction of isometric projection, terminology, isometric projections and isometric views, isometric views of planes, right solids, truncated solids and composite solids.

Reference Books:

1. "Engineering Graphics", by Varghese
2. "Engineering Drawing", by Leonel Zurbito
3. "Engineering Drawing", by N.D. Bhatt.
4. "Engineering Drawing", by C. Agarwal & Basant Agarwal.
5. "Engineering Drawing", by P.S. Gill.

List of Experiments

1. Drawing various types of scales using representative fraction.
2. Drawing various conics section.
3. Projection of points in all quadrants.
4. Projection of straight lines in all quadrants in various orientations.
5. Projection of geometrical planes with various orientations.
6. Projection of solid models with various orientations.
7. Projection of section of solids by using various types of cutting planes.
8. Drawing development of surface using various methods of prisms, pyramids, cone,

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cylinder, etc.

9. Drawing anti-development of surfaces.

10. Drawing isometric projections using various methods and isometric views.


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			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTHU101		COMMUNICATION SKILLS I	0	0	0	0	50	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

To develop, enhance and demonstrate (A) LSRW Skills, (B) oral presentation skills (C) To prepare students to become more confident and active participants in all aspects of their undergraduate programs.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. The students will be able to enhance confidence in their ability to read, comprehend, organize, and retain written information.
2. The students will be able to improve upon their language skills, oral communication skills, group discussion, personal development and confidence level.
3. The students will be able to bridge the language gap vital to their success.
4. The students will be able to communicate effectively.

Syllabus

Unit - I

Listening Skills: Listening: Process, Types of Listening: Active, Passive, Pseudo, Evaluative, Difference between listening and hearing. Listening Comprehension exercises.

Unit - II

Speaking Skills: Extempore, Debates, Oral Presentation, Just a Minute.

Unit - III

Linguistics and Phonetics: Consonants and vowel symbols, CV structure, Place and Manner of articulation.

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Unit – IV

Developing Reading Skills: Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies, Benefits of effective reading, reading comprehension of Technical material and SQ3R reading technique.

Unit - V

Vocabulary Building: Synonyms, antonyms, idioms and proverbs.

Reference Books:

1. "Business Correspondence and Report Writing", by Sharma. TMH.
2. "Spoken English", by R.K. Bansal and IB Harrison. Orient
3. "New International Business English", by Joan's and Alexander. Longman. OUP.
4. "Effective Technical Communication. ", by Ashraf Rizvi. (2005). New Delhi: Tata Mc Graw Hill


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			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*					
BTME103		WORKSHOP PRACTICES	0	0	0	30	20	0	0	2	1	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

To paraphrases with (A) workshop technology, industrial safety, and understand material properties. (B) Carpentry shop, fitting shop, (C) welding and casting.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes students will be able to

1. Student would be able to understand the need of workshop, technology related to it, and industrial safety and precautions.
2. Student would be able to use carpentry tools, analyses various wood joints and their properties.
3. Students would be able to use fitting tools to make various shapes and design.
4. Student would be able to recognize various welding techniques and their needs.
5. Students would be able to design various shapes by using casting technologies.

Syllabus

Unit -I

Introduction to Workshop Technology & Industrial Safety

Workshop Technology: Introduction, need of workshop and types of workshop

Industrial Safety- Introduction, objective of industrial safety, causes of accidents, common sources of accidents, preventive measures, and common safety methods.

Unit -II

Carpentry Shop Carpentry: Introduction, types of timbers, defects in timbers, timber prevention, characteristics of good timber, common tools used in carpentry shop (marking and measuring tools; cutting tools and striking tools), and common wood joints (cross-lap, corner-lap, dovetail and bridle joints).

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Unit -III

Fitting Shop Fitting: Introduction, tools used in fitting shop (measuring tools, holding tools, cutting tools, striking tools and supporting tools) and operation performed in fitting work.

Unit -IV

Welding Shop Welding: Introduction, terminological elements of welding process, welding joints (lap joints and butt weld joint), welding positions, advantages and disadvantages of welding, classification of welding, gas welding processes and safety recommendation for gas welding.

Unit -V

Casting: Pattern making and sand casting, Pattern materials, Types of pattern, Pattern allowances. Core prints. Moulding sand, ingredients, classification, sand additives, properties of moulding sand, sand preparation and testing. Green sand mould preparation. Cores and core making – Types of cores.

Reference Books:

1. "Production Technology", by R.K. Jain
2. "Principles of Manufacturing Material & Process", by Campbeu
3. "Welding: Principles & Practise", by Bonhart
4. "Welding and Welding Technology", by Little
5. "Principles of Foundry Technology", by Jain
6. "Manufacturing Technology", by P. N. Rao
7. "Workshop Technology", by B.S. Raghuvanshi

List of Experiments

1. To study various industrial safety precautions & preventive measures.
2. To study the various timber properties, its defects and its prevention.
3. To make various joints (L-joint, T-joint, Cross joint, etc.) using carpentry tools.
4. To perform various fitting shop operations using fitting tools.
5. To study various welding methods and its safety precaution.
6. To make various welding joints (Butt joints, Lap, joints, corner joints, etc).
7. To study sheet metal properties and safety precautions.
8. To make various shapes using sheet metal tools and terminologies.

14/9/17

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