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B. Tech. in Mechanical 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*				
BTMA201		APPLIED MATHEMATICS II	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 Calculus of Matrices, Differential Equations 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

1. Understand and apply the basics of the calculus of matrices.
2. Solve the fundamental problems of the ordinary differential equations.
3. Apply the advanced techniques to find the solution of the ordinary differential equations.
4. Know the techniques of the numerical analysis.
5. Find the numerical solution of the ODE and PDE.

Syllabus

Unit - I

Calculus of Matrices: Systems of linear equations and their solutions. Matrices, determinants, rank and inverse. Linear transformations. Range space and rank, null space and nullity, Eigenvalues and eigenvectors, Similarity transformations, Diagonalization of Hermitian matrices, Bilinear and quadratic forms.

Unit - II

Differential Equation: Ordinary Differential Equations: First order linear and nonlinear ordinary differential equations, exactness and integrating factors. Ordinary linear differential equations of n-th order, solutions of homogeneous and non-homogeneous equations. Operator method. Method of undetermined coefficients and variation of parameters.

Unit - III

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Differential equation: Power series methods for solutions of ordinary differential equations. Legendre equation and Legendre polynomials, Bessel equation and Bessel functions of first and Second kind.

Unit – IV
Numerical Analysis Interpolation and Curve Fitting: Introduction to Interpolation; Calculus of Finite Differences; Finite Difference and Divided Difference Tables; Newton-Gregory Polynomial Form; Lagrange Polynomial Interpolation; Theoretical Errors in Interpolation; Spline Interpolation; Approximation by Least Square Method.

Numerical Differentiation and Integration: Discrete Approximation of Derivatives: Forward, Backward and Central Finite Difference Forms, Numerical Integration, Simple Newton-Cotes Rules: Trapezoidal and Simpson's (1/3) Rules; Weddle's Rule, Gaussian Quadrature Rules: Gauss-Legendre, Gauss-Laguerre, Gauss-Hermite, Gauss-Chebychev.

Unit – V
Numerical Solution of Ode & Pde: Euler's Method for Numerical Solution of ODE; Modified Euler's Method; Runge-Kutta Method (RK2, RK4), Error estimate.

Multistep Methods: Predictor-Corrector method, Adams-Moulton Method; Boundary Value Problems and Shooting Method; finite difference methods, numerical solutions of elliptic, parabolic, and hyperbolic partial differential equations.

Numerical Solution of Ode &Pde: Euler's Method for Numerical Solution of ODE; Modified
Reference Books:

1. *"Advanced Engineering Mathematics", by E. Kreyszig, 9th Edition, Wiley, 2005.*
2. *"Introduction to Real Analysis", by R. G. Bartle and D. R. Sherbert, 5th Ed, Wiley, 1999.*
3. *"Calculus: Early Transcendentals", by J. Stewart, 5th Ed, Thomas Learning (Brooks/ Cole), Indian Reprint, 2003.*
4. *"Numerical Methods for Engineers and Scientists", by J. D. Hoffman, McGraw-Hill, 2001.*
5. *"Numerical methods for scientific and engineering computation", by M.K Jain, S.R.K Iyengar and R.K Jain, (Fourth Edition), New Age International (P) Limited, New Delhi, 2004."*
6. *"Linear Algebra and Its Applications", by G. Strang, 4th Edition, Brooks/Cole, 2006*
7. *"Differential Equations, S. L. Ross", by 3rd Edition, Wiley, 1984.*
8. *"An Introduction to Ordinary Differential Equations", by E. A. Coddington, Prentice Hall, 1995.*
9. *"Elementary Differential Equations and Boundary Value Problems", by W.E. Boyce and R.C. DiPrima, 7th Edition, Wiley, 2001.*
10. *B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi*

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*	L	T	P	CREDITS
BTCH101		APPLIED CHEMISTRY	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):

To give basic knowledge (A) of polymer science, (B) of electrochemistry and its laws, (C) of corrosion and control over it, (D) various sophisticated instrumental techniques, (E) of water, lubricants and different properties of water.

Course Outcomes (COs):

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

1. Theoretical understanding of various high polymers and their properties.
2. Became aware of the importance of electrochemistry and its laws in the field of technology and dealing with its numerical approach.
3. Understanding metal corrosion and control over it.
4. Implementing instrumental techniques as powerful tool for qualitative and quantitative analysis of compounds.
5. Analyzing boiler feed water for industrial use and drinking water for domestic use.

Syllabus

Unit - I

Polymers and Reinforced Plastics: Classification of polymers - types of polymerization reactions - mechanism of addition polymerization: free radical, ionic and Ziegler – Natta.
Effect of structure on the properties of polymers - strength, plastic deformation, elasticity and crystallinity -Preparation and properties of important resins: Polyethylene, PVC, PMMA, Polyester, Teflon, Bakelite and Epoxy resins - compounding of plastics - moulding methods - injection, extrusion, compression

Unit - II

(a) Electrochemistry: Arrhenius theory of electrolytic dissociation, Transport number,

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Kohlrausch's law, Solubility product, Redox reaction, Electrochemical and concentration cells.

Corrosion and Its Control: Corrosion: Basic concepts - mechanism of Chemical, electrochemical corrosion, Pilling Bedworth rule, Types of Electrochemical corrosion, galvanic corrosion, differential aeration corrosion, pitting corrosion - stress corrosion Measurement of corrosion (wt. loss method only), factors influencing corrosion,

Corrosion control: Cathodic protection, sacrificial anodic method, corrosion inhibitors. Protective coatings: surface preparation for metallic coatings - electro plating (copper plating) and electroless plating (Nickel plating) - chemical conversion coatings - anodizing, phosphating & chromate coating

Unit - III

(a)Basic Instrumental Techniques: Basic principles, instrumentation and applications of potentiometry, UV - visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy and flame photometry.

(b)Engineering Materials: Cement, Refractories etc.

Unit - IV

(a)Water Treatment: Water quality parameters: Physical, Chemical & Biological significance - Hardness of water - estimation of hardness (EDTA method) - Dissolved oxygen – determination (Winkler's method), Alkalinity - determination - disadvantages of using hard water in boilers: Scale, sludge formation - disadvantages - prevention - treatment: Internal conditioning - phosphate, carbon and carbonate conditioning methods - External: Zeolite, ion exchange, Lime Soda methods &Numerical- desalination - reverse osmosis and electro dialysis - domestic water treatment.

(b)Surface Tension: Introduction; Origin of Surface Tension; Surface energy; Laplace & Young-Laplace Equation, Capillarity; Contact Angle; Measurement of Surface Tension by Capillary rise method; Variation of Surface Tension of a liquid with Temperature and Concentration.

(c)Lubricants: Mechanism of lubrication, Classification of lubricants, Properties & testing of lubricating oil. Definition of viscosity of a liquid; Determination of Viscosity; Shear Viscosity; Intrinsic Viscosity; Molecular weight from Viscosity measurement & Numerical problems based on viscosity index.
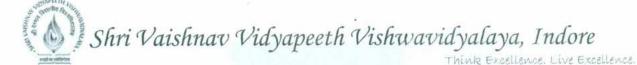
Unit - V

Metal in Industry: Structure of coordination compounds corresponding to coordination number up to 6, Types of ligands, Isomerism [geometrical, optical, ionization, linkage and coordination], Theories of bonding in coordination compounds- crystal field theory, Valence bond theory, Chelation.

Reference Books:

1. *"Applied Chemistry – Theory and Practice"*, by O.P. Viramani, A.K. Narula, New Age Pub.
2. *"Polymer Science"*, by Ghosh, Tata McGraw Hill.

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3. *"Chemistry for Environmental Engineering", by Sawyer, McCarty and Parkin –McGraw Hill, International.*
4. *"Basic Lubrication theory", by Alistair Cameron*
5. *"Engineering chemistry", by Dr. Jyoti Mitna*
6. *"Engineering chemistry", by Dr. Sunita Ratan*
7. *"Applied Chemistry", by S.M. Khopkar*
8. *"Polymer Science", by V.R. Gowawriker*
9. *"Introduction of polymer science", by G.S. Mishra*

List of Experiments

1. To estimate the strength of the given unknown solution of Mohr's salt (Ferrous Ammonium sulphate ($FeSO_4(NH_4)_2SO_4.6H_2O$) using $KMnO_4$ solution as an intermediate.
2. Estimation of hardness by EDTA method.
3. Conduct metric titration - determination of strength of an acid.
4. Estimation of iron by potentiometry.
5. Determination of molecular weight of polymer by viscosity average method
6. Determination of Na / K in water sample by Flame photometry (Demonstration)
7. Determination of total alkalinity and acidity of a water sample.
8. Estimation of calcium ions present in tap water. (TDS)
9. To determine the viscosity of a given liquid (30% sugar   solution) at room temperature using Ostwald's viscometer.
10. Testing of Flash point of lubricating oil by Pensky Martins apparatus.
11. To determine the viscosity index by Red Wood Viscometer 1 & 2.

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B. Tech. in Mechanical Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTEC102		FUNDAMENTALS OF ELECTRONICS ENGINEERING	60	20	20	30	20	3	0	2	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):

The subject aims to provide the student with an understanding of (A)basic Electronics Engg. abstractions on which analysis and design of electronic circuits and systems are based, basic devices (analog and digital) and instrumentation abstractions.(B)The capability to use abstractions to analyze and design simple electronic circuits.(C)The ability to formulate and solve the different logic circuits and Bqolean equations.(D)An understanding of how devices such as semiconductor diodes, rectifiers, and bi-polar junction transistors are working and how they are used in the design of useful circuits.

Course Outcomes (COs):

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

1. Students will: Learn how to develop and employ circuit models for elementary electronic components, e.g., resistors, sources, inductors, capacitors, diodes and transistors.
2. Become adept at using various methods of circuit analysis, including simplified methods such as series-parallel reductions, voltage and current dividers, etc.
3. Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis.
4. Learn how the primitives of Boolean algebra are used to describe the processing of binary circuits and to use electronic components as building blocks in electronically implementing binary functions.

Syllabus

Unit - I

Evolution and Impact of Electronics in industries and in society: Familiarization of Resistors, Capacitors, Inductors, Transformers and Electro mechanical components.
PN Junction diode: Structure, Principle of operation, Photo diode, LED, Solar cell.

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Unit - II

Rectifiers and power supplies: Half wave and full wave rectifier, capacitor filter, Zener voltage regulator, Bipolar Junction Transistors: Structure, Principle of operation, characteristics Amplifiers.

Unit - III

Basic Instruments: Electrical measurement – measurement of voltage, current, power & energy, voltmeters & ammeter, wattmeter, energy meter, Electronics instrument – multimeter, CRO (analog & digital), an overview of voltage regulator.

Unit - IV

Number System: Introduction to binary, octal, decimal & hexadecimal systems, representation of negative numbers, 1's, 2's, 9's, 10's complement and their arithmetic. Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean algebra, Boolean Functions, Complement of Boolean Function. Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and NOR Gate implementation.

Unit - V

Signals: Introduction, Representation of Discrete-time Signals: Graphical Representation, Functional Representation, Tabular Representation, Sequence Representation.
Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, Triangular Pulse Function,

Reference Books:

1. *"Electronic Devices and Circuits", by Bell, D. A., Oxford University Press*
2. *"Electronic Devices and Circuit Theory", by Boylested, R. L. and Nashelsky, L., Pearson Education*
3. *"Digital Design", by M. Morris Mano and Michael D. Ciletti, Pearson Education*
4. *"Signals and Systems", by Anand Kumar, PHI.*
5. *"Basics of Electronics Engineering", by Vijay Baru, Rajendra Kaduskar, Sunil T. Gaikwad, Wiley India Pvt. Ltd.*

List of Experiments

1. Familiarization with Laboratory Instruments (Oscilloscope, Function Generator, Digital Multimeter, DC Power Supply)
2. Characterization of Passive Circuit Elements (R, L, C)
3. Time & Frequency Response of RC and RL Circuits
4. V-I curve for P-N Junction Diodes.
5. V-I curve for Zener Diode.

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6. Zener as a voltage regulator
7. Half-Wave and Full-Wave (Centre tapped and Bridge) Rectifiers
8. Bipolar Junction Transistor (BJT) Circuits (Inverter, Common Emitter Amplifier)
9. Conversion of number system
10. Basic Combinatorial Circuits

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Shri Vaishnav Vidyapeeth Vishwavidyalaya
Bachelor of Technology (Civil Engineering)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE 101	DCS	FUNDAMENTALS OF CIVIL ENGINEERING	60	20	20	30	20	3	0	2	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 10 marks.

Course Objectives:
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 (D)

Course Outcomes:
The 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: Stones, bricks, concrete, cement, lime, mortar, timber-types, properties & uses. Nominal proportion of Concrete, preparation of concrete, compaction, curing.

UNIT II
Construction Elements: Elements of Building Construction- Types and their suitability, Foundations & footings, brick masonry walls, floors, roofs, Doors, windows, lintels, staircases.

UNIT III
Surveying: Introduction to surveying Instruments – levels, Theodolite, plane tables and related devices. Measurement of distances – by EDM, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.

UNIT IV
Mapping & Sensing: Mapping details and contouring, measurement of areas, volumes, application of measurements in quantity computations, Introduction of remote sensing and its applications.

UNIT V
Roads: Types of Roads, Nagpur Road Plan, Components of Road and their function; Bridges: types and Important parts of bridges.

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Suggested Readings:
1. S. Ramamrutam & R.Narayanan; Basic Civil Engineering, Dhanpat Rai Publication.
2. B.C. Punmia, Surveying, 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 Gurucharan Singh- Standard Book House, New Delhi
6. Global Positioning System Principles and application- Gopi, TMH

List of Practical's:
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 leveling exercise by height of instrument of Rise and fall method.
3. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
4. To determine the workability of fresh concrete of given proportions by slump test or compaction factor test.
5. To determine the Compressive Strength of brick.
6. To determine particle size distribution and fineness modulus of course and fine Aggregate.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTME101		ENGINEERING DRAWING	60	20	20	30	20	2	0	4	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 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, Involutes, Archimedean and Logarithmic spirals.

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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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								CREDITS
			THEORY			PRACTICAL		L	T	P	
			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.

Corse 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*
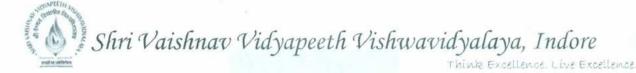7. *"Workshop Technology", by B.S. Raghuvanshi*

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.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSTMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSTMENT*				
BTME104		INTRODUCTION TO CAD & SOLID MODELLING	0	0	0	0	50	0	0	4	2

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) CAD, related applications with it and its need, (B) 2-D
and 3-D modeling terms, draw and editing commands and utility commands.

Course Outcomes (COs):

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

1. Student would be able to understand CAD, its application and limitations.
2. Students would be able to use 2-D drawing, editing commands and its applications.
3. Student would be able to use solid modelling commands, and to understand various modelling methods.
4. Students would be able to solve assembly related problems.
5. Students would be able to draw various 2-D, solid models and analyze various machine assemblies.

Syllabus

Unit - I

Introduction to Cad: Introduction, history of 2D and solid modeling, menus, toolbars,
pointing device, command prompt, function keys

Unit - II

2-D Drawing& Editing Commands: Introduction, line commands, coordinate
systems, orthogonal lines, circle and arc commands, etc
Editing Commands: Introduction, erase and selection commands, move
commands, copy commands, extend command, trim command, mirror command, etc
Layers & Linotypes: Introduction, layers status line weights, object properties.

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Unit - III

Solid modelling

Types of Modelling: Solid modeling, surface modeling and wire frame modeling

Draw Commands: Introduction, polygon, cuboids, donut, ellipse, multiline, conic sections, etc

Editing Commands: Introduction, extrudes, revolve, sweep, etc

Unit - IV

Assembly Drafting: Introduction, constraints, exploded views, interference check, layout, standard and section views, dimensioning, detailing and plotting.

Unit - V

Part Design: Introduction, 2-d model (triangle, rectangle, circle, etc), solid models (nut, bolts, small machine parts), machine assemblies

Reference Books:

1. *"An Introduction to Computer Aided Design (CAD)", by A. Mustun*
2. *"Mastering AutoCAD 2016 and AutoCAD LT 2016", by G. Omura*
3. *"AutoCAD 3D Training Manual", by K.S. Kurland*
4. *"CAD/CAM: Principles and Application", by Rao*
5. *"Computer Aided Manufacturing", by Rao*
6. *"CAD/CAM: Theory and Practices", by Zeid*
7. *"Mastering CAD/CAM (SIE",) by Zeid*

List of Experiments

1. To study various software for Computer Aided drafting.
2. To study various drawing commands for 2-D drawing in AutoCAD.
3. To study various editing commands from 2-D drawing in AutoCAD.
4. To draw various 2-D drawing using AutoCAD.
5. To study various solid modelling commands in AutoCAD.
6. To draw various solid models using AutoCAD.
7. To study various utility commands in AutoCAD.
8. To study various assemblies and drafting used in machine components.

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