Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Name of Program: Bachelor of Technology in Robotics and Automation

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
BTEC104	EC	Digital Logic & Circuit Design	60	20	20	30	20	3	1	2	5

Legends: Th - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
Q/A – Quiz/Assignment/Attendance, MST Mid Semester Test.
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives:-

The objective of this course is to-
1. Use of Boolean algebra and Karnaugh Map to simplify logic function.
2. Describe the operation of different Combinational and Sequential Logic Circuits.

Course Outcomes:-

After completion of this course the students will be able to-
1. Design an optimal digital logic circuit to meet the given specifications.
2. Evaluate the performance of the given digital logic circuit based on specific criteria for reliable system implementation.

UNIT I

Number System & Codes: Introduction to number systems, Binary numbers, Octal & Hexadecimal Numbers, Number base Conversion, Signed binary numbers : 1's Complement & 2's Complement representation and their arithmetic operation, Floating point representation, binary codes, BCD,ASCII, EBCDIC, Gray codes, Error detecting and Correcting codes, Hamming codes.

UNIT II

Boolean algebra and Logic gates: Introduction, Logic operations, Axioms and laws of Boolean algebra, Demorgan's theorem, Boolean functions, Canonical and standard forms. Logic gates and their applications, universal gates, NAND-NOR implementation of logic functions. Minimization techniques for logic functions-K-map, Tabular / Quine McCluskey method.

UNIT III

Combinational logic: Arithmetic circuits- Half adder, Full adder, Half subtractor, Full subtractor, Parallel and Serial adder, BCD adder, Multiplexer, De-multiplexer, Encoder & Decoder.

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UNIT IV

Sequential logic: Introduction, Latch and Flip Flop- S-R, D, JK and T, State diagram, characteristic equation, state table and excitation table, Flip flop conversion, applications of Flip flop, Counters, Registers.

UNIT V

Semiconductor Memories and A/D and D/A converters: Semiconductor Memory – RAM, ROM- Organization, operation and their Types, PLD- PAL, PLA, PROM, FPGA, Analog to Digital (A/D)and Digital to Analog (D/A) converters and their types.

Text Books:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.
2. S Salivahanan and S Arivazhagan: Digital Circuits and Design, 4th Edition, Vikas Publishing House, 2012.

Reference Books:

1. A. Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, PHI, 2016.
2. Floyd and Jain, "Digital Fundamentals", 10th Edition, Pearson Education India, 2011.
3. Roland J. Tocci, Widmer, Moss, "Digital Systems Principles and Applications", 10th Edition, Pearson 2009.
4. Stephen Brown, Zvanko Vranesic, "Fundamentals of Digital Logic Design", 3rd Edition, McGraw Hill, 2017.

List of experiments:

1. To study and test of operation of all logic gates for various IC"s (IC7400, IC7403, IC408, IC74332, IC7486).
2. Verification of DeMorgan's theorem.
3. To construct of half adder and full adder.
4. To construct of half subtractor and full subtractor circuits.
5. Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Design a BCD to excess 3code converter.
8. Design a Multiplexer/ Demultiplexer
9. Analysis of various flip flops with Preset and Clear capability.
10. Design of Johnson and Ring counter.
11. Design of synchronous and asynchronous up/down counters.

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Name of Program: Bachelor of Technology in Robotics and Automation

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers 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 10 marks.

Course Educational Objectives (CEOs):

To introduce the students with the Fundamentals of the Calculus of Matrices, Differential Equations and Numerical Analysis

Course Outcomes

After the successful completion of this course students will be able to
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.

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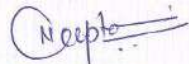
UNIT – II
Differential Equation
Ordinary Differential Equations: First order linear and nonlinear ordinary differential equations, exactness and integrating factors. Ordinary linear differential equations of n-th order, solutions of homogeneous and non-homogeneous equations. Operator method. Method of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

UNIT – III
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.

Texts:
- G. Strang, Linear Algebra And Its Applications, 4th Edition, Brooks/Cole, 2006
- S. L. Ross, Differential Equations, 3rd Edition, Wiley, 1984.
- E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall, 1995.
- W.E. Boyce and R.C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 7th Edition, Wiley, 2001.
- K. E. Atkinson, Numerical Analysis, John Wiley, Low Price Edition (2004).
- S. D. Conte and C. de Boor, Elementary Numerical Analysis An Algorithmic Approach, McGrawHill,2005.
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi

References:
- E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley, 2005.
- R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 5th Ed, Wiley, 1999.
- J. Stewart, Calculus: Early Transcendentals, 5th Ed, Thomas Learning (Brooks/ Cole), Indian Reprint, 2003.
- J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd Edition, Texts in Applied Mathematics, Vol. 12, Springer Verlag, 2002.
- J. D. Hoffman, Numerical Methods for Engineers and Scientists, McGraw-Hill, 2001.
- M.K Jain, S.R.K Iyengar and R.K Jain, Numerical methods for scientific and engineering computation (Fourth Edition), New Age International (P) Limited, New Delhi, 2004.
- S. C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, McGraw-Hill 2008.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya
Bachelor of Technology (Civil Engineering)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	THEORY			PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	
BTCE 103		APPLIED MECHANICS	2	1	2	4	60	20	20	30	20	

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 familiarize with different branches of mechanics (B) with emphasis on their analysis and application to practical engineering problems(C) efficiently & effectively (D)

Course Outcomes:
The students will be able to
1. To apply knowledge of mathematics, science in engineering.
2. To identify, formulate, and solve engineering problems
3. Demonstrate various types of forces and their analysis.
4. Demonstrate shear force and bending moment on structural member i.e. beams
5. Demonstrate centre of gravity and moment of inertia determination of different geometrical shaped figures.

Syllabus:
UNIT I
Static & Dynamic Forces: Introduction to Engineering Mechanics, Classification of Engineering Mechanics, Statistics, Dynamics, Kinematics, Kinetics etc. Fundamental Laws of Mechanics. Introduction to Dynamics, basic concepts and terms used in Dynamic motion, Types of Motion.
Force, Pressure and Stress, Free Body Diagram , Bow's Notation, Characteristics and Effects of Force, System of Forces, Resolution of a Force, Composition of Forces, Resultant / Equilibrant Force.

UNIT II
Law of Parallelogram of Forces, Law of Triangle of Forces, Polygon Law of Forces, Lami's Theorem, Equilibrium of a Body under Two / Three/ more than Three Forces. Law of Superposition of Forces. Moment Force, of a Principle of Moments/ Varignon's Theorem, Parallel Forces, Resultant of Parallel Forces, Couple, Moment of a Couple, Resolution of Force into a Couple.

UNIT III
Analysis of Framed Structure: Frame, Types of frame, Truss, Types of truss, Analysis of Truss, Various methods of Analyzing the truss, Numerical analysis of truss

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UNIT IV

Beams: Types of Beams: Simply Supported Beam, Overhanging Beam, Cantilever Beam. Types of Supports of a Beam or Frame: Roller, Hinged and Fixed Supports. Load on the Beam or Frame: Different Types of Loading. Support Reaction of a Beam, Shear force, Bending Moment.

UNIT V

Centre of Gravity and Moment of Inertia: Centroid, Centre of Gravity, Determination of Centroid of Simple Figures, Centroid of Composite Sections. Centre of Gravity of Solid Bodies. Area Moment of Inertia: Basic Concept of Inertia, Definition of Moment of Inertia, Theorems of Moment of Inertia, Radius of Gyration, Polar Moment of Inertia of Standard Sections, Moment of Inertia of Composite Section, Principal Moment of Inertia , Mass Moment of Inertia.

Suggested Readings:

1. Prasad I.B., Applied Mechanics, Khanna Publication.
2. Shesha Prakash and Mogaveer; Elements of Civil Engineering & Engineering Mechanics; PHI
3. S.P,Timoshenko, Mechanics of stricture, East West press Pvt.Ltd.
4. R.C. Hibbler – Engineering Mechanics: Statics & Dynamics.
5. R.K. Rajput, Engineering Mechanics S.Chand & Co. Delhi

List of Practical's:

1. To verify the law of Triangle of forces
2. To verify the Lami's theorem.
3. To verify the law of parallelogram of forces.
4. To verify law of polygon of forces
5. To determine support reaction and shear force at a given section of a simply Supported beam and verify in analytically using parallel beam apparatus.
6. To determine the moment of inertia of fly wheel by falling weight method.
7. To verify bending moment at a given section of a simply supported beam.
8. Study of Various Beams and their Loading conditions

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Name of Program: Bachelor of Technology in Robotics and Automation

SUBJECT CODE	Cate-gory	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC101		Introduction to Communication 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 10 marks.

Course Educational Objectives (CEOs):
The student will be able to understand the basics of various communication systems.

Course Outcomes (COs):

After successfully completing the course students will be able to
1. Understand the communication systems and channels.
2. Understand the concept of modulation and demodulation
3. Learn the basic concepts of voice communication, optical fiber and satellite communication.

Syllabus

UNIT I
Communication Process, Communication System and its elements, Types of Communication media/channels and its characteristics, Types of Electronic Communication one-way, two-way, half duplex and full duplex, Electromagnetic Spectrum and its Bandwidth.
Definition of Signals & Systems, Information, Time and Frequency Representation of Signals, types of signals, Spectrum & bandwidth of signals, Fourier analysis of signals

UNIT II
Definition of Modulation and Demodulation, need of modulation, representation of various Modulation scheme (Analog and Digital), Multiplexing & its types: TDM, FDM, CDM.

UNIT III
Voice communication, Frequency range, Introduction to telephone instruments & signals, Basic telephone operation, Public switched telephone network (PSTN), Mobile technology evolution, GSM & CDMA systems.

UNIT IV
Optical fiber transmission and communication, History of optics, block diagram of Optical fiber communication system, principle of operation, types of optical fibers

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UNIT V
Basics of Radio waves, layers of atmosphere. Satellite communication, History of Satellites, Kepler's laws, Satellite orbits and geostationary satellites.

Text Books:
1. Wayne Tomasi: Advanced Electronic Communication Systems, Sixth Edition, PHI.
2. Robert L. Shrader: Electronic Communication, Macmillan/McGraw-Hill.
3. B.P. Lathi : Modern Analog and Digital Communication System, Wiley Eastern Limited.
4. Taub and Schilling: Principles of communication Systems, TMH.

References:
1. S Haykin: Communication Systems, John Wiley and Sons Inc.
2. S Ghose: Signals and Systems, Pearson Education.
3. Steven: Communication Systems – Analysis and Design, Pearson Education.
4. Hwei P. Hsu: Schaum's Outline of Signals and Systems, McGraw-Hill.
5. Singh and Sapre: Communication Systems, TMH.
6. Reger J. Bates & D.W. Gregory, Voice & Data Communication Handbook, Fifth Edition, TMH.

List of Experiments:
1. Study of Function Generator.
2. Study of various signals onCRO and measurement of time period and frequency.
3. Synthesis of signal using Fourier series.
4. Introduction to MATLAB/ qtOctave.
5. Generation of basic signals using MATLAB/ qtOctave.
6. Mathematical analysis of basic signal operations.
7. Analyze AM signal using MATLAB/ qtOctave.
8. Analyze time division multiplexed signals.
9. Study of optical fiber communication system.
10. Study and analysis of serial communication.

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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				
BTME102		FUNDAMENTALS OF MECHANICAL 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):

To introduction with (A) Engineering Materials, (B) Thermodynamics, heat engines (C) Boiler and Steam (D) Refrigeration & Air conditioning, (E) Production.

Course Outcomes (COs):

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

1. Students would be able to understand the need of engineering materials, and its property, need and defects.
2. Students would be able to analyses basics of thermodynamics and able to understand various mechanical instruments.
3. Students would be able to understand I C engines, their working and operating conditions.
4. Students will be able to understand the basics of refrigeration & air conditioning.
5. Students would be able to recognize production methodology and their need.
6. Students would be able to demonstrate various case studies based on heat engines, basics of thermodynamics, productions.

Note: - Steam table is permit during examination.

Syllabus

Unit - I

Introduction to Engineering Materials: Introduction, classification materials, need of engineering materials, mechanical properties like strength, hardness, toughness, ductility, brittleness, malleability etc. of materials, Stress-strain diagram of ductile and brittle materials, Hooks law and Modulus of elasticity.

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Unit - II

Introduction to Thermodynamics: Definition of thermodynamics, thermodynamic systems, Macroscopic and Microscopic views, thermodynamic equilibrium, properties of system, point & path function, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy.

Unit - III

Introduction to Heat Engines: Introduction, need of heat engines, types of heat engines.
IC Engines: Introduction, terminology of IC engine, Carnot, Otto and Diesel cycles P-V & T-S diagrams and its efficiency, two and four stroke engines, latest technologies used in engines of vehicle.
Boilers: Introduction, classification of boilers, working of Cochran, Lancashire, Locomotive and Babcock and Wilcox boilers, mountings & accessories.
Introduction of steam, steam formation, properties of steam, use of steam table.

Unit - IV

Introduction to Refrigeration: Introduction, need of refrigeration, reverse Carnot cycle, unit of refrigeration, coefficient of performance, Vapor compression cycle, P-h and T-S diagrams, deviations from theoretical cycle.
Air Conditioning: Introduction and need of air conditioning, air conditioning components and control.

Unit-V

Introduction to Manufacturing: Introduction of basic manufacturing process, introduction to casting, Rolling, Extrusion, Arc and Gas welding, Brazing, Soldering. Introduction to Lathe and Drilling machines and their various operations.

Reference Books:

1. "Mechanical Engineering", by R. K. Rajput
2. "Basic Mechanical Engineering", by D. K. Gupta
3. "Basic Mechanical Engineering (MP") by Domkundwar
4. "Mechanical Engineering", Handbook (CRC Press)
5. "Mechanical Engineering Reference Book", by E.H. Smith
6. "An Introduction to Mechanical Engineering", by Wickert/Lewis
7. "Engineering Fundamentals: An Introduction to Engineering:, by Moaveni

List of Experiments

1. To perform tensile test, plot the stress-strain diagram and evaluate the tensile properties of a given metallic specimen.
2. To calculate Mechanical Advantage, Velocity ratio and efficiency of various temperature and pressure measuring devices and plot graphs.
3. To study Two-Stroke and Four-Stroke Diesel Engines.

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4. To study Two-Stroke and Four-Stroke Petrol Engines.
5. To study Cochran and Babcock and Wilcox boilers.
6. To study Lancashire and Locomotive boilers.
7. To study working and function of mountings and accessories in boilers.
8. To study the Refrigeration System.
9. To study the functioning of Window Room Air Conditioner.
10. To Study Lathe & Drilling Machines and various operation.
11. To perform Arc and Gas Welding operation on metal.

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Name of Program: Bachelor of Technology in Robotics and Automation

SUBJECT CODE	Catego-ry	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC103		**Electronics Workshop**	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 10 marks.

Course Educational Objectives (CEOs):
This course will help the student to use and test different types of electronics components, different basic electrical and Electronics instruments used in electrical & electronics circuits and systems.

Course Outcomes (COs):
1. To gain the Knowledge of Various electronics component.
2. Students will understand how to measures / characterize components through measuring instruments.
3. Students will test various electrical and electronics components, and measure circuit parameters.
4. Students will: Learn how to develop and employ circuit models for elementary electronic components

Syllabus

UNIT I
Cables and Switches: Differentiate various Cables, Connectors, Differentiate the various Switches& their usage. Connect and use cables, connectors and switches.
Protective devices: Electrical Protective devices –fuses, relay and MCB

UNIT II
Electrical and Electronics Components: Resistors, capacitors, inductors and transformers. Integrated circuits and it Packaging Technique. Soldering technique, tools and PCB

UNIT III
Measuring Instruments: Overview of Voltmeter, Ammeter, Multimeter, CRO.

UNIT IV
Electrical Drawing: Wiring diagram and control circuit: point D. C. motor starter, point D.C. motor starter, DOL starter, Star delta starter, Auto Transformer Starter, Rotor resistance starter, Control of lamp from positions.

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UNIT V
Different types of Diodes: P-N Junction diode, Zener diode , Schottky Diode,

List of experiments.

1. Identify different types of cables & test it.
2. Identify different types of connectors & Discover their application.
3. Identify different types of Switches and discover its usage.
4. Identify different types of fuses & test it.
5. Identify different types of Relays and discover its usage.
6. Identify, find value using colour code chart and test different types of Resistors.
7. Identify, find value and test different types of capacitors.
8. Identify, find value and test different types of Inductors.
9. Connect Resister ,capacitor, inductor in series and parallel circuits
10. Draw front panel control of analog and digital multimeter label it.
11. Demonstrate external controls of CRO & function Generator.
12. Measure amplitude & frequencies of different sine waveform using CRO & Function Generator.
13. Test resistor, capacitor, inductor, P-N junction Diode using CRO & Multimeter.
14. Identify Various IC packages.
15. Identify various SMD components.

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B. Tech. in Mechanical Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*	L	T	P	CREDITS
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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