



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) Scheme in light of NEP-2020**  
**B. Tech/B.Tech+MBA in Mechanical Engineering**  
**(2023-2027) Revised Syllabus**

COURSE CODE	CATEG ORY	COURSE 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*				
BTME105	BEC	FUNDAMENTALS OF MECHANICAL ENGINEERING AND APPLIED MECHANICS	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 Educational Objectives (CEOs):**

The objective of the course is to develop basic knowledge of (A) engineering materials (B) thermodynamics, I.C. engines & boilers (C) Forces and Equilibrium (D) centroid & moments of inertia.

**Course Outcomes:**

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 understand the need of engineering materials and its properties.
2. Student would be able to understand the basics of thermodynamics and boilers.
3. Student would be able to understand working principle of IC engines.
4. Students will be able to demonstrate various types of forces and their analysis.
5. Students will be able to calculate the centre of gravity and moment of inertia of different geometrical shaped figures.

**Syllabus:**

**UNIT I**

**(8 Hrs)**

**Introduction to Engineering Materials:** Introduction, Classification of Engineering Materials, Mechanical properties like strength, hardness, toughness, ductility, brittleness, malleability etc. of materials, Tensile Test-Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity, Hardness, and Impact testing of materials, BHN etc.

**UNIT II**

**(9 Hrs)**

**Thermodynamics:** Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy.


**Steam & Boilers:** Formation of steam, steam processes, classification and working of boilers, mountings and accessories of boilers, efficiency and performance analysis of boilers, height of chimney.

  
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**UNIT III (8 Hrs)**

**IC Engines:** Working principle of IC Engine, Terminology of IC engine, Carnot, Otto, and Diesel cycles P-V & T-S diagrams and its efficiency, working of two stroke & four stroke Petrol & Diesel engines.

**Unit - IV (10 Hrs)**

**Forces and Equilibrium:** Graphical and Analytical Treatment of Concurrent and non-concurrent, Co-planar forces, free Diagram, Force Diagram and Bow's notations, Types of supports and their reactions. Analysis of plane Trusses: Method of joints, Method of Sections. Frictional forces in equilibrium problems.


**UNIT V (10 Hrs)**

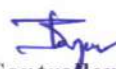
**Centre of Gravity and moment of Inertia:** Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple.

**Text and Reference Books:**

1. "Basic Mechanical Engineering" by Dr. V. M. Domkundwar and S. S. Bhavikatti, Nirali Prakashan, 2018.
2. "Mechanical Engineering" by R.K. Rajput, S. Chand & Co. Delhi, 2019.
3. "An Introduction to Mechanical Engineering" by Jonathan Wickert and Kemper Lewis, CENGAGE Learning, 2012.
4. "Engineering Mechanics" by Shames and Rao, Pearson Edu(I), 2005.
5. "Engineering Mechanics (Statics & Dynamics)" by R.C. Hibler, Pearson Edu(I), 2015.
6. "A Text book of Applied Mechanics" by R.K. Rajput, Laxmi Pub. 2016.
7. "A Textbook of Engineering Mechanics" by R K Bansal, Laxmi Pub. 2005.

  
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BTME105	BEC	FUNDAMENTALS OF MECHANICAL ENGINEERING AND APPLIED MECHANICS	60	20	20	30	20	3	0	2	4

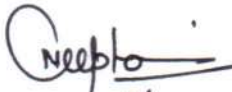
**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;


**\*Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.


**List of Experiments:**

1. To perform tensile test, plot the stress- strain diagram and evaluate the tensile property of a given specimen.
2. Study of different IC Engines.
3. Study of various types of Boilers.
4. Study of different types of Boilers Mountings and accessories.
5. Problems relating to centroid of composite areas.
6. Problems on moment of inertia, polar moment of inertia, radius of gyration, polar radius of gyration of composite areas.
7. Problems involving frictional forces.
8. Analysis of simple trusses by method of joints, method of sections & graphical method.
9. Problems on shear force and bending moment diagrams.

  
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# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## Shri Vaishnav Institute of Science

### Department of Physics

#### Choice Based Credit System (CBCS)


#### B. Tech. (Common for All branches)

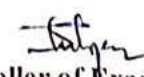
Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment *				
BTPH101	DC	Applied Physics	60	20	20	30	20	3	1	2	5

Course Objectives	<ol style="list-style-type: none"><li>1. To develop the comprehensive understanding of laws of physics.</li><li>2. To develop ability to apply laws of physics for various engineering applications.</li><li>3. To develop the experimental skills, ability to analyze the data obtained experimentally to reach substantiated conclusions.</li></ol>
Course Outcomes	<ol style="list-style-type: none"><li>1. Student will be able to comprehend laws of physics.</li><li>2. Student will be able to apply laws of physics for various engineering applications.</li><li>3. Student will be able to determine physical parameter experimentally and will be able to analyze the data obtained experimentally to draw substantiate conclusions.</li></ol>

Abbreviation		Teacher Assessment (Theory) shall be based on following components: Quiz / Assignment/ Project / Participation in class (Given that no component shall be exceed 10 Marks).
Th	Theory	
T	Tutorial	
P	Practical	Teacher Assessment (Practical) shall be based on following components: Viva / File / Participation in Lab work (Given that no component shall be exceed 50% of Marks).

  
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## Shri Vaishnav Institute of Science

### Department of Physics

#### Choice Based Credit System (CBCS)

#### BTPH101: Applied Physics

#### 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.

#### 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.

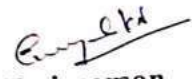
#### UNIT VI: Laser & Fiber Optics


Stimulated and Spontaneous Emission, Einstein's A&B Coefficients, Population Inversion, Pumping, Techniques of Pumping, Optical Resonator, Properties and Applications of Laser, Ruby, Nd:Y AG, 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, Introduction to Diffraction and its Types, Diffraction at Michelson's interferometer and its application, Resolving power, Rayleigh criterion, Resolving power of grating, Concept of single slit, double slit, resolving power, Rayleigh criterion, Resolving power of grating, Concept of polarized light, Double refraction, quarter and halfwave plate, circularly & elliptically polarized light.

  
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**Department of Physics**  
**Choice Based Credit System (CBCS)**  
**BTPH101: Applied Physics**

**REFERENCES**

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 MN. Avdhanulu & P. G. Kshirsagar, S. Chand & Co. Edition (2012).
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 & JF.B.Hawkes, "" Prentice-Hall II Edition.
10. "LASER theory and applications", by A. K. Ghatak & Tyaga raja n, TMH (1984).

  
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**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Program Name: Bachelor of Technology**

SUBJECT CODE	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
		THEORY			PRACTICAL		Th	T	P	CREDITS
		END SEM	MST	Q/A	END SEM	Q/A				
BTMA201N	Mathematics II	60	20	20	-	-	3	1	-	4

**Course Objective**

*To introduce the students to the fundamentals of integral calculus, differential equations, and numerical methods.*

**Course Outcomes**

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

- 1. know the fundamental principles of integral calculus;*
- 2. apply the techniques of integral calculus to the problems of rectification, volume and surface of revolution of curves;*
- 3. construct and solve the differential equations of higher order;*
- 4. use the concept of finite differences and interpolation in evaluation of value of functions.*

**Course Content:**

**UNIT – I:** Calculus of finite differences: Operators, forward difference operator, backward difference operator, E-operator, relation between them, difference of a polynomial, factorial polynomial, Inverse operator. forward difference table, Backward difference Table.

**UNIT – II:** Interpolation: Introduction to Interpolation; Interpolation with equally spaced interval, forward and backward interpolation formula, Interpolation with unequally spaced intervals, Newton divided difference interpolation, Langrange's formula for interpolation and inverse interpolation.

**UNIT – III:** Integral calculus: fundamental theorem of integral calculus, length of curves, volume, and surface area of revolution of curves.

**UNIT – IV:** Evaluation of integrals using gamma function. Multiple integral: Double integral, area by double integral. Evaluation of triple integrals.

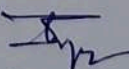
**UNIT – V:** Linear differential equations of  $n^{\text{th}}$  order: Linear differential equations of  $n^{\text{th}}$  order, method of variation of parameter and Cauchy's homogenous linear equations.

  
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**Program Name: Bachelor of Technology**

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		THEORY			PRACTICAL		Th	T	P	CREDITS
		END SEM	MST	Q/A	END SEM	Q/A				
BTMA201N	Mathematics II	60	20	20	-	-	3	1	-	4

**Texts:**

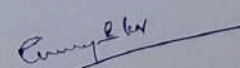
- T. M. Apostol, Calculus, Volume I, 2nd Ed, Wiley, 1967.
- T. M. Apostol, Calculus, Volume II, 2nd Ed, Wiley, 1969.
- K. E. Atkinson, Numerical Analysis, John Wiley, Low Price Edition (2004).
- S. D. Conte and C. de Boor, Elementary Numerical Analysis - An Algorithmic Approach, McGraw-Hill, 2005.
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi
- Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Ed, John Wiley Publisher.

**References:**

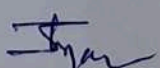
- J. Stewart, Calculus: Early Transcendentals, 5th Ed, Thomas Learning (Brooks/ Cole), Indian Reprint, 2003.
- J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd Edition, Texts in Applied Mathematics, Vol. 12, Springer Verlag, 2002.
- J. D. Hoffman, Numerical Methods for Engineers and 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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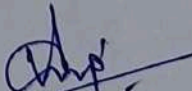
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## Name of Program: B.Tech. in Computer Science and Engineering

SUBJECT CODE	Category	SUBJECT 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*				
BTEC104		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:** Introduction to number systems: Decimal, Binary, Octal and Hexadecimal, Base Conversion. Signed Binary Numbers: Signed magnitude, 1's Complement and 2's Complement representation and their arithmetic operations, 32-bit Floating-point representation.

**Codes:** Types of code, Binary code, BCD, Gray code, Excess-3. BCD Addition, Code Conversion, Error Detecting and Correcting code: Even and Odd Parity, Hamming code.

### UNIT II

**Boolean algebra and Logic gates:** Introduction to logic gates, Boolean Laws, De-morgan's theorem, Consensus theorem, Implementation using logic gates, Simplification of Boolean Expression using Boolean Laws, Canonical and Standard (SOP and POS) forms. Universal gates, NAND-NOR implementation of logic functions. Karnaugh Maps (K-maps), Minimization of logic functions using K-map. Don't Care Conditions.



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### **UNIT III**

**Combinational circuits:** Arithmetic circuits- Half adder, Full adder, Half subtractor, Full subtractor, Parallel Adder, BCD adder, Multiplexer, De-multiplexer, Encoder and Decoder. Design of Combinational circuits using Multiplexer and Decoder.

### **UNIT IV**

**Sequential Circuits:** Introduction, Asynchronous and Synchronous Sequential circuits, Latches and Flip Flops: SR, D, JK and T. Characteristic equation, Characteristic and Excitation table. Master-Slave Flip-flop, Race around conditions, Flip flop conversion.

### **UNIT V**

#### **Applications of Flip-flop:**

**Shift Register:** SISO, SIPO, PISO, PIPO, Left and Right Shift Register, Bidirectional Shift Register.

**Counter:** Ring counter, Johnson Counter, Asynchronous Up/down counter, Synchronous Up/down counters: State diagram, state table and realization, Mod-N Counter.

#### **Text Books:**

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

#### **Reference Books:**

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

#### **List of experiments:**

1. To study the operation of various logic gates and verify their truth tables.
2. To verify De Morgan's theorem
3. To verify the versatility of NAND and NOR gates
4. To compare and verify standard SOP/POS expression with minimized Boolean form using K-map.
5. To design and verify Adder and subtractor circuits.
6. To design and verify multiplexer and demultiplexer using basic logic gates.
7. To realize 4-bit parallel adder circuit.
8. To design and verify encoder and decoder circuits using ICs.
9. To verify the truth table of different flip flops.
10. To verify the functionality of shift register.
11. To verify the functionality of counter circuit.





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**B.Tech. in Electronics and Communication**  
**(2021-2025)**

COURSE CODE	CATE-GORY	COURSE 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	AECC	Electronics Workshop	0	0	0	30	20	0	0	2	1

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

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**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 its 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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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC103	AECC	Electronics Workshop	0	0	0	30	20	0	0	2	1

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

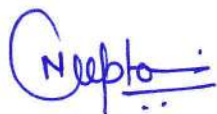
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#### UNIT V

**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 Resistor, 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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BTME103	BEC	WORKSHOP PRACTICES	0	0	0	30	20	0	0	2	1

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**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:**

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 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**

(6 Hrs)

**Introduction to Workshop Technology & Industrial Safety:**

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

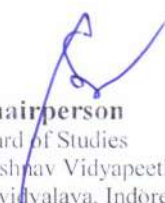
**Industrial Safety-** Introduction, objective of industrial safety, causes of accidents, common sources of accidents, preventive measures, and common safety methods.

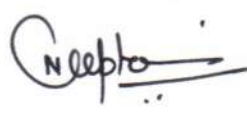
**UNIT II**

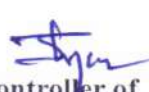
(6 Hrs)


**Carpentry Shop:**

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**

**(6 Hrs)**

**Fitting Shop:**

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**

**(6 Hrs)**

**Welding Shop:**

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**

**(6 Hrs)**

**Casting:**

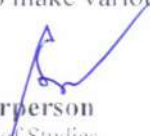
Pattern making and sand casting, Pattern materials, Types of pattern, Pattern allowances. Core prints. Moulding sand, ingredients, classification, sand additives, properties of moulding sand, sand preparation and testing. Green sand mould preparation. Cores and core making – Types of cores.

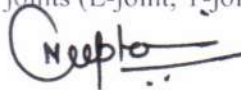
**Text and Reference Books:**


1. "Workshop Technology (Part-I)" by W.A.J. Chapman, CBS Pub, 2001.
2. "Production Technology (Vol-I)" by R.K. Jain, Khanna Publishers, 9<sup>th</sup> ed. 2019.
3. "Principles of Manufacturing Material & Process" by J.S. Campbell McGraw Hill, 1984.
4. "Welding: Principles & Practices" by Edward R. Bonhart, McGraw Hill Edu. India
5. "Welding and Welding Technology" by Richard L. Little, McGraw Hill, 2017.
6. "Principles of Foundry Technology" by P.L. Jain, McGraw Hill, 2017.
7. "Manufacturing Technology (Vol-I)" by P. N. Rao, McGraw Hill, 2017.
8. "Workshop Technology (Vol-I)" by B.S. Raghuvanshi, Dhanpat Rai & Co. 2015.

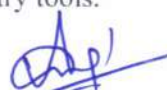
**List of Experiments:**

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.

  
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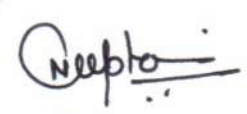
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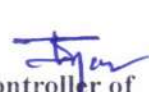
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4. To perform various fitting shop operations using fitting tools.
5. To study various welding methods and its safety precaution.
6. To make various welding joints (Butt joints, Lap, joints, corner joints, etc).
7. To study various types of patterns and pattern allowances.
8. To study properties of moulding sand and prepare a mould.
9. To study various types of cores and its application in casting.

  
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