



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

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BTMA201	BS	Applied Mathematics II	60	20	20	-	-	3	1	-	4

### Course Objective

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 solve of the ordinary differential equations.
4. Know and apply the techniques of the numerical analysis for the solution of the ODE and PDE.

### Course Content:

#### 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.

Chairperson

Board of Studies

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

Chairperson

Faculty of Studies

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

Controller of Examination

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

Joint Registrar

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



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

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BTMA201	BS	Applied Mathematics II	60	20	20	-	-	3	1	-	4

**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

**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, 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, McGraw-Hill, 2005.

Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

Controller of Examination  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

Joint Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



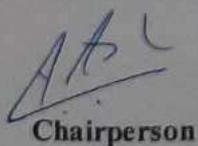
**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Program Name: Bachelor of Technology**

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BTMA201	BS	<b>Applied Mathematics II</b>	60	20	20	-	-	3	1	-	4

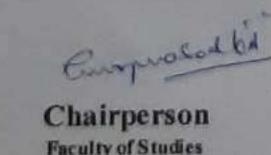
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi

**References:**

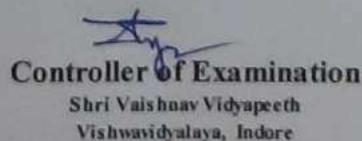
- E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley, 2005.
- R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 5th Ed, Wiley, 1999.
- J. Stewart, Calculus: Early Transcendentals, 5th Ed, Thomas Learning (Brooks/ Cole), Indian Reprint, 2003.
- J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd Edition, Texts in Applied Mathematics, Vol. 12, Springer Verlag, 2002
- 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.
- J.D.Hoffman, Numerical Methods for Engineers and Scientists, McGraw-Hill, 2001.

  
**Chairperson**

Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**

Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examination**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## Shri Vaishnav Institute of Science

### Department of Physics

#### Choice Based Credit System (CBCS)

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

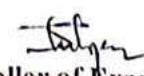
Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment *				
BTPH101	DC	Applied Physics	60	20	20	30	20	3	1	2	5

<b>Course Objectives</b>	<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>
<b>Course Outcomes</b>	<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	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).
T	Tutorial	
P	Practical	

  
**Chairperson**  
 Board of Studies  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Chairperson**  
 Faculty of Studies  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Controller of Examination**  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore

  
**Joint Registrar**  
 Shri Vaishnav Vidyapeeth  
 Vishwavidyalaya, Indore



# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## 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.

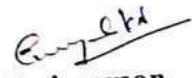
### UNIT VI: Laser & Fiber Optics

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, 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 halfwave plate, circularly & elliptically polarized light.

  
**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examination**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



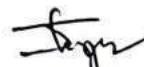
**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Science**  
**Department of Physics**  
**Choice Based Credit System (CBCS)**  
**BTPH101: Applied Physics**

**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 Subraminayan.
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).

  
**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examination**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Science**

**Department of Physics**  
**Choice Based Credit System (CBCS)**

**BTPH101: Applied Physics**

**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 "A" of LASER light source using Diffraction Grating.
7. Determination of Planck's constant by using photocell.
8. Determination of Energy band gap (Eg) 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.  $\mu$  and  $\omega$  of given prism using spectrometer.
15. Measuring height of a given object using Sextant.

  
**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examination**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**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)**

COURSE CODE	CATEGORY	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*				
BTME201	BEC	FUNDAMENTALS OF MECHANICAL MEASUREMENT	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):**

1. Develop fundamental understanding of mechanical measurements
2. Impart knowledge of measurement concepts and their practice.
3. Develop knowledge of measurement errors and their causes.

**Course Outcomes (COs):**

After learning the course the students should be able to:

- (1). Students will describe basic concepts of mechanical measurement
- (2). Students will understand linear and angular measuring instrument for measurement of various components
- (3). Students will be able to measure force, torque and strain.
- (4). Students will be able to measure displacement, velocity, acceleration etc.
- (5). Students will be able to measure temperature, pressure and surface finish.

**Syllabus**

**Unit - I**

(10 Hrs)

**Mechanical Measurement**

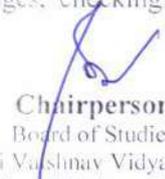
Need of mechanical measurement, Basic Terminology and Definition: Hysteresis, Linearity, Resolution of measuring instruments, Threshold, Drift, Zero stability, loading effect and system response. Measurement methods, Generalized Measurement system, limit-gauging, various systems of limits, fits and tolerance, interchangeability, ISI and ISO system, basic principles and design of standards of measuring gauges; types of gauges and their design, accuracy and precision, calibration of instruments, principles of light interference, interferometer, measurement and calibration; Static performance characteristics, Errors and their classification.

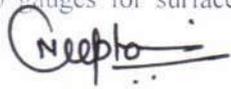
**Unit – II**

(9 Hrs)

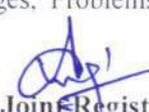
**Linear and Angular Measurements:**

Linear Measurement Instruments, Vernier calliper, Micrometer, Interval measurements: Slip gauges, checking of slip gauges for surface quality, Optical flat, Limit gauges, Problems on

  
**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**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)**

COURSE CODE	CATEGORY	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*				
BTME201	BEC	FUNDAMENTALS OF MECHANICAL MEASUREMENT	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.

measurements with gauge. angular measuring instruments; sine bar, angle gauges; spirit level, autocollimators, clinometers; measurement of straightness, flatness and squareness.

**Unit – III** **(9 Hrs)**

**Measurement of Force, Torque and Strain:**

*Force measurement:* load cells, cantilever beams, proving rings, differential transformers.

*Measurement of torque:* Torsion bar dynamometer, servo controlled dynamometer, absorption dynamometers, Power Measurements.

*Measurement of strain:* Mechanical strain gauges, electrical strain gauges, strain gauge: materials, gauge factors, theory of strain gauges and method of measurement, bridge arrangement, temperature compensation.

**Unit – IV** **(8 Hrs)**

**Displacement, Velocity/Speed, and Acceleration, Measurement:**

Working principal of Resistive Potentiometer, Linear variable differential transducers, Electro Magnetic Transducers, Mechanical, Electrical and Photoelectric Tachometers, Piezoelectric Accelerometer, Seismic Accelerometer.

**Unit - V** **(9 Hrs)**

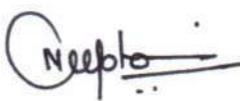
**Temperature Measurement:**

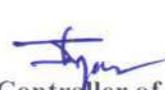
Temperature Measuring Devices: Thermocouples, Resistance Temperature Detectors, Thermistor, Liquid in glass Thermometers, Pressure Thermometers, Pyrometer, Bimetallic strip. Calibration of temperature measuring devices

**Pressure Measurement:** Relative pressure scales, pressure reference instruments, barometer, manometer, deadweight tester, pressure gauges and transducers etc.

**Measurement of surface finish:** Surface finish definitions, types of surface texture, surface roughness measurement methods, comparison, profile-meters, pneumatic and replica, measurement of run out and concentricity.

  
Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Controller of  
Examinations  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Joint Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**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)**

COURSE CODE	CATEGORY	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*				
BTME201	BEC	FUNDAMENTALS OF MECHANICAL MEASUREMENT	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.

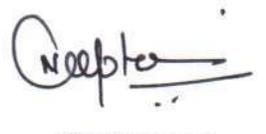
**Text and Reference Books:**

1. Engineering Metrology and Measurement, N V Raghavendra and Krishnamurthy, Oxford University Press, 2013.
2. Metrology and Measurement, Anand Bewoor & Vinay Kulkarni McGraw-Hill, 2009.
3. Instrumentation, Measurement and Analysis, B.C. Nakra, K.K. Chaudhry McGraw-Hill, 2017.
4. A course in Mechanical Measurements and Instrumentation, A K Sawhney, Dhanpat Rai Publications, 2005.
5. Mechanical Measurements and Instrumentations, Er. R K Rajput, Kataria Publication (KATSON), 2012.
6. Mechanical Measurement & Control by D.S. Kumar, Metropolitan Book Co. 2017.
7. Mechanical Measurement and Metrology by R K Jain, Khanna Publisher, 1994.

**List of Experiments:**

1. Basic understanding of measurements: concepts, application, advantage and future aspects
2. Linear measurement of various objects and check different characteristics of measurements.
3. Angular measurement of various objects and check different characteristics of measurements.
4. Temperature measurements and check different characteristics of measurements and also do calibration
5. Temperature measurements and calibration of thermocouple.
6. Performance on Stress, strain and force measurements and check different characteristics of measurements and also do calibration
7. Performance on Speed/Velocity, acceleration measurements.
8. Performance on surface measurements

  
**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



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

COURSE CODE	CATEGORY	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*				
BTAU201	DC	AUTOMOBILE ENGINEERING AND VEHICLE SAFETY	60	20	20	0	0	3	0	0	3

**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 objectives of the course is to develop knowledge of (A) Chassis layout (B) Transmission Systems (C) Control Systems (D) Suspension Systems (E) Vehicle Safety and Motor Vehicle Act

**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 describe the function of a given part of the specified automobile chassis/frame/ body.
2. Students will be able to explain design considerations and features of special purpose vehicles and classify special type of vehicles based on the need and purpose.
3. The students will be able to describe the function and able to select the type of clutch, gear box and transmission system for the given application.
4. The students will be able to Identity different safety systems of vehicles and understanding the motor vehicle act-related terms.

**Syllabus**

**UNIT I**

**Introduction, Vehicle Layout and Chassis**

**Introduction:** Definition, Classification of automobiles, Major components of Automobiles with their function and location.

**Vehicle Layout:** Definition Significance of Vehicle Layout, Different types of vehicle layouts (FFWD, FRWD, RERWD, 4WD), Advantages, Disadvantages, Applications and comparisons of different types of vehicle layouts.

**Chassis:** Requirement, Function, Classification, Advantages, Disadvantages and applications of Chassis, Basic body nomenclature.

**Special Purpose Vehicles:** Classification of Special Purpose Vehicles based on applications, Wheel type & Track type vehicle, Power Plants, Transmission, Final Drive, Multi-axle vehicles.

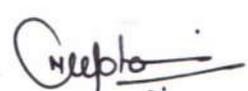
**UNIT II**

**Automobile Transmission Systems**

**Clutch:** Function, Requirement, working principle and classification of clutch, Construction and working of single plate, Multiplate and centrifugal clutch.

  
**Chairperson**

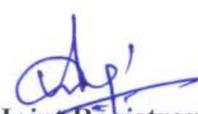
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**

Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examination**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



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

COURSE CODE	CATEGORY	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*				
BTAU201	DC	AUTOMOBILE ENGINEERING AND VEHICLE SAFETY	60	20	20	0	0	3	0	0	3

**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.

**Gear Box:** Function, Necessity, Classification of gear box, Construction and working of constant mesh and synchro mesh gear box; Epicyclic gear train.

**Transmission:** Function, Construction and working of automatic transmission and semi-automatic transmission, flywheel, torque converter, propeller shaft, universal and slip joint, differential, stub axle, semi floating and fully floating rear axle.

### UNIT III

#### Automobile Control Systems

**Braking System:** Principle of braking, Function and requirement of braking system: Basic terms related to braking (stopping distance, braking efficiency, fading of brakes); Types of braking system: layout, construction, Working of drum, Disc, Hydraulic and air brakes. Master cylinder, Wheel cylinder, Tandem master cylinder, Significance and general procedure of bleeding of brake. Anti-lock braking system.

**Steering System:** Function and requirements of steering system, Basic terms related to steering (steering ratio, turning radius, under steering and over steering), Basic components of steering linkages. Types of steering gear boxes, working of hydraulic and electronic power steering. steering geometry, significance and ranges of camber and caster (Positive, Negative), Toe-in, Toe out, King pin inclination (KPI), steering axis inclination (SAI)

### UNIT IV

#### Vehicle Safety

**Vehicle Safety:** Survival space requirements, Restraints systems used in automobiles, Types of safety belts, Head restraints, Air bags, Use of energy absorbing systems in automobiles, Impact protection from steering controls, Design of seats for safety, Types of seats. Importance of bumpers, Damageability criteria in bumper designs. Types of safety glass and their requirements, Types of rear-view mirrors and their assessment. Warning devices, Hinges and Latches etc.

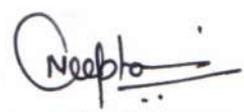
### UNIT V

#### Motor Vehicle Act

**Motor Vehicle Act:** Introduction, Objectives, and salient Features of M. V. Act 1988 or latest M. V. Act. (After the amendment of M. V. Act 1988), Latest central motor vehicle rules. Important transport terms (definitions) in M. V. Act (Motor Vehicle, Motor Cycle, HGV, MG, LGV, Public Service Vehicle, Transport Vehicle, Driver Passenger Accident) Organization Structure of Motor Vehicle (RTO) Department, Duties and Responsibilities of RTO, AIMV.

  
Chairperson

Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Chairperson

Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Controller of Examination

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Joint Registrar

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



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

COURSE CODE	CATEGORY	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*				
BTAU201	DC	AUTOMOBILE ENGINEERING AND VEHICLE SAFETY	60	20	20	0	0	3	0	0	3

**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.

**Text Books:**

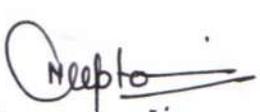
1. "A Text Book of Automobile Engineering", Rajput R. K., Laxmi Publications Pvt. Ltd., New Delhi, 2008.
2. "Automobile Engineering", Kamaraju Ramakrishna, PHI Learning Pvt. Ltd., New Delhi, 2012
3. "Automobile Engineering (Vol I and II)", Dr. Kirpal Singh, Standard Publishers, New Delhi, 2004.
4. "Automotive Mechanics", Crouse W.H., Anglin D.W Tata McGraw Hill Publications, Delhi, 1965.

**Reference Books:**

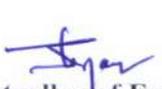
1. "Construction Equipment Operation & Maintenance", Y. Pokras and M. Tushnyakov, MIR, Moscow.
2. "Truck Cranes", A. Astskhov, MIR, Moscow.
3. "Motor Graders", E.G. Poninson, MIR, Moscow.
4. "Motor Vehicle Act, 1988", CMV Rules Eastern Book Company, Mumbai.
5. "Compendium of Transport Terms", CIRT, Pune Central institute of Road Transport, CIRT Publications, Bhosari Pune, 2007.
6. "The Drivers Manual", Pasricha P. S. Nasha Publications, Mumbai, 1994
7. "Road Safety Guide", Pasricha P. S. Nasha Publications, Mumbai, 1994

  
Chairperson

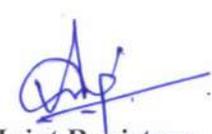
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Chairperson

Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Controller of Examination

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Joint Registrar

Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**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)**

COURSE CODE	CATEGORY	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*				
BTME101	BEC	ENGINEERING DRAWING	60	20	20	30	20	1	0	4	3

**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 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:**

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**

(8 Hrs)

**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

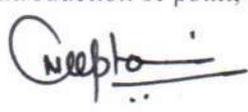
**UNIT II**

(9 Hrs)

**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

  
Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Controller of  
Examinations  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Joint Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**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)**

COURSE CODE	CATEGORY	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*				
BTME101	BEC	ENGINEERING DRAWING	60	20	20	30	20	1	0	4	3

**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.

**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** **(9 Hrs)**

**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** **(8 Hrs)**

**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** **(7 Hrs)**

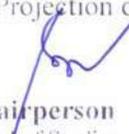
**Isometric Projections:** Introduction of isometric projection, terminology, isometric projections and isometric views, isometric views of planes, right solids, truncated solids and composite solids.

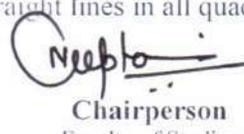
**Text and Reference Books:**

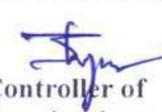
1. "Engineering Graphics" by P.I. Varghese, McGraw Hill Edu., 2012.
2. "Engineering Drawing and graphics" by K. Venugopal, New Age (I) Pub., 2004.
3. "Engineering Drawing" by N.D. Bhatt, Charotar Publishing House, 2014.
4. "Engineering Drawing" by Basant Agarwal & C.M. Agarwal, McGraw Hill Edu., 2013.
5. "Engineering Drawing" by P.S. Gill, S.K. Kataria & Sons, 2013.

**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.

  
**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



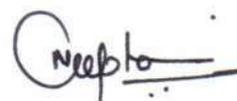
**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) Scheme in light of NEP-2020**  
**B. Tech/B.Tech+MBA in Mechanical Engineering**  
**(2023-2027)**

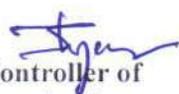
COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTME101	BEC	ENGINEERING DRAWING	60	20	20	30	20	1	0	4	3

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.

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, cylinder, etc.
9. Drawing anti- development of surfaces.
10. Drawing isometric projections using various methods and isometric views.

  
**Chairperson**  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Chairperson**  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Controller of Examinations**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
**Joint Registrar**  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**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)**

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*					
BTME103	BEC	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 10 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:**

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

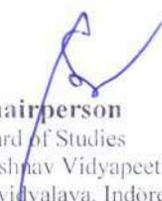
**Industrial Safety-** Introduction, objective of industrial safety, causes of accidents, common sources of accidents, preventive measures, and common safety methods.

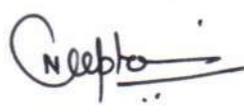
**UNIT II**

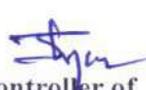
(6 Hrs)

**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).

  
Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Controller of  
Examinations  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Joint Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



**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)**

COURSE CODE	CATEGORY	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*					
BTME103	BEC	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 10 marks.

**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:**

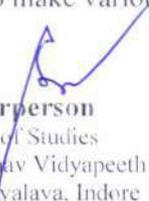
Pattern making and sand casting, Pattern materials, Types of pattern, Pattern allowances. Core prints. Moulding sand, ingredients, classification, sand additives, properties of moulding sand, sand preparation and testing. Green sand mould preparation. Cores and core making – Types of cores.

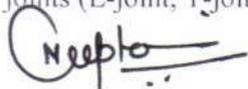
**Text and Reference Books:**

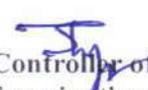
1. "Workshop Technology (Part-I)" by W.A.J. Chapman, CBS Pub, 2001.
2. "Production Technology (Vol-I)" by R.K. Jain, Khanna Publishers, 9<sup>th</sup> ed. 2019.
3. "Principles of Manufacturing Material & Process" by J.S. Campbell McGraw Hill, 1984.
4. "Welding: Principles & Practices" by Edward R. Bonhart, 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.

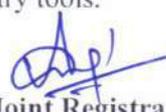
**List of Experiments:**

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.

  
Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Controller of  
Examinations  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Joint Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



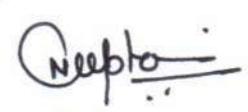
**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Technology and Science**  
**Choice Based Credit System (CBCS) Scheme in light of NEP-2020**  
**B. Tech/B.Tech+MBA in Mechanical Engineering**  
**(2023-2027)**

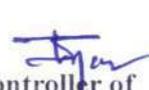
COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTME103	BEC	WORKSHOP PRACTICES	0	0	0	30	20	0	0	2	1

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 10 marks.

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.

  
Chairperson  
Board of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Chairperson  
Faculty of Studies  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Controller of  
Examinations  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore

  
Joint Registrar  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore