



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. in Mechanical Engineering
(2024 - 2028)

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*				
BTME601A	DSE	OPERATION RESEARCH AND SUPPLY CHAIN	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):

This course provides a fundamental understanding of (A) linear programming, assignment models and transportation model (B) Network model, waiting line models and game theory (C) Supply chain management.

Course Outcomes (COs):

After completion of this course the students will be able to describe the following:

1. Students will be able to formulate and solve linear programming problems.
2. Students will be able to solve assignment and transportation problems for optimal resource allocation.
3. Students will be able to perform sequencing and network analysis using PERT and CPM techniques.
4. Students will be able to analyze waiting line models and game theory problems for decision-making.
5. Students will be able to understand and apply the concepts of supply chain management, inventory management, and logistics.

Syllabus

Unit-I

(10 Hrs)

Introduction: History and development of Operations Research; Scientific Methods, Characteristics, Scope, Models in Operations Research.

Linear Programming: Formulation, graphical methods, simplex method, Big- M- method.

Unit-II

(9 Hrs)

Assignment Models: Definition, Mathematical Representation, Formulation and Solution, Alternate optimal solution.

Transportation Models: Definition, Formulation and solution, Alternate optimal solution, Steppingstone method, Modified distribution (MODI) or U-V method.

Unit-III

(9 Hrs)

Sequencing Models: Processing n jobs through two machines, m machines and processing two jobs through m machines, minimal path problem

Network Analysis: Network diagram, Time estimation, Basic steps in PERT and CPM, PERT computation, CPM computation, critical path, Float, Cost analysis, crashing the network.



Chairperson

Board of Studies

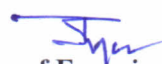
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



Chairperson

Faculty of Studies

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



Controller of Examinations

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



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. in Mechanical Engineering
(2024 - 2028)

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*				
BTME601A	DSE	OPERATION RESEARCH AND SUPPLY CHAIN	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.

Unit-IV

(9 Hrs)

Waiting Line Model: Introduction, classification, state in queue, probability distribution of arrival and service times, Single server model (M/M/I), Multiple server model (MMS), Birth and death process.

Game Theory: Game Theory and Simulation Theory of Game, Competitive Game, Two Persons, zero sum games, maxima and Minima Principles, Saddle Point, Method of Dominance, Monte-Carlo simulation and application.

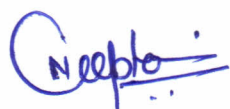
Unit-V

(10 Hrs)

Supply Chain Management: Introduction to Supply Chain (SC), its importance and advantages; key national and international issues; Push, Pull, and Push–Pull systems; Supply Chain strategies; direct shipment, cross-docking, centralized and decentralized systems; inventory management, Economic Order Quantity (EOQ), demand uncertainty, continuous and periodic review policies, risk pooling, bullwhip effect; demand forecasting, aggregate planning, logistics, and Supply Chain network configuration.

Text and Reference Books:

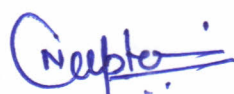
1. "Introduction to Operations Research" by Frederick S. Hillier and Gerald J. Lieberman, 12th Edition (2024 Release), McGraw-Hill Education, 2025.
2. "Operations Research: An Introduction" by Hamdy A. Taha, 10th Edition, Pearson Education, 2017.
3. "Operations Research" by Prem Kumar Gupta and D. S. Hira, 7th Edition, S. Chand Publishing, Latest Available Edition.
4. "Principles of Operations Research: With Applications to Managerial Decisions" by Harvey M. Wagner, 2nd Edition, Prentice-Hall of India (PHI Learning).
5. "Textbook of Logistics and Supply Chain Management" by D. K. Agrawal, Macmillan, 2003.
6. "Fundamentals of Supply Chain Management: Twelve Drivers of Competitive Advantage" by John T. Mentzer, SAGE Publications, 2004.
7. "Fundamentals of Queueing Theory" by Donald Gross, John F. Shortle, James M. Thompson and Carl M. Harris, 5th Edition, Wiley, 2018.
8. "Supply Chain Management: Strategy, Planning, and Operation" by Sunil Chopra and Peter Meindl, 8th Edition, Pearson Education, 2022.



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



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 NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU601C	DE	MODERN VEHICLE TECHNOLOGY	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):

Students will be able to understand the latest advancements in vehicle design, powertrains, safety features, and connected technologies. Foster critical thinking and problem-solving skills to address challenges and opportunities in modern vehicle technology.

Course Outcomes (COs):

Students will be able to:

1. Provide an understanding of the latest trends and developments in modern vehicle design and engineering.
2. Introduce advanced powertrain technologies, including hybrid and electric propulsion systems.
3. Examine the latest safety features and innovations in vehicle crashworthiness and active safety systems.
4. Explore the integration of connected technologies, including telematics and vehicle-to-everything (V2X) communication.

Syllabus

UNIT I

Introduction to Modern Vehicle Technology: Evolution of automotive technology, Trends and challenges in the automotive industry.

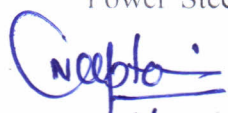
Advanced Powertrain Technologies: Hybrid powertrains: Series, parallel, and series-parallel configurations, Electric vehicles: Battery-electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs), Fuel cell vehicles (FCVs) and alternative propulsion systems.

UNIT II

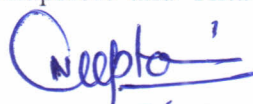
Connected Vehicle Technologies: Global Positioning Systems, Geographical Information Systems, Navigation Systems, Automotive Vision System, Road Recognition, Driver Assistance Systems – Connected Vehicles, Telematics and vehicle connectivity, Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) communication, Autonomous Vehicles, Levels of autonomy and self-driving capabilities, Challenges and opportunities in autonomous vehicle development.

UNIT III

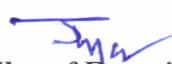
Comfort Systems: Active Suspension Systems, Requirement and Characteristics, Different Types, Power Steering, Collapsible and Tilttable Steering Column, Power Windows, Biometric Systems.



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



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 NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU601C	DE	MODERN VEHICLE TECHNOLOGY	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.

Adaptive Control Systems: Adaptive Cruise Control, Adaptive Noise Control, Anti Spin Regulation.

UNIT IV

Vehicle Safety Innovations: Active and Passive Safety Systems, Airbags, Seat Belt Tightening System, Collision Warning Systems, Child Lock, Anti-lock braking (ABS), electronic stability control (ESC), and autonomous emergency braking (AEB), Advanced Driver Assistance Systems (ADAS), Adaptive cruise control (ACC) and lane-keeping assist, Blind-spot monitoring and forward collision warning. Crash Worthiness of Vehicle, Vehicle Crash Testing, Testing with Dummies. Security Systems - Anti Theft Technologies, Smart Card System, Number Plate Coding.

UNIT V

Advanced Materials in Vehicle Design: Lightweight materials; Aluminum, composites, and high-strength steel. Impact on vehicle performance, fuel efficiency and safety.

Future Trends and Environmental Considerations: Urban mobility and shared mobility concepts. Innovations in vehicle design and human-machine interfaces. Vehicle emissions and environmental impact, Sustainable mobility solutions and green transportation.

Text & References Books:

1. "Automotive Technology: A Systems Approach" by Jack Erjavec and Rob Thompson, Cengage Learning, 2019.
2. "Electric and Hybrid Vehicles: Design Fundamentals" by Iqbal Husain Publisher, CRC Press, 2010.
3. "Vehicle Crashworthiness and Occupant Protection" by Du Bois, Paul, et al., Automotive Applications Committee, American Iron and Steel Institute, Southfield, Michigan (2004).
4. "Introduction to Autonomous Robots: Mechanics, Sensors, Algorithms" by Nikolaus Correll, Bradley Hayes, et al., CRC Press 2022.
5. "Connected vehicles: Technology review, state of the art, challenges and opportunities." By Abdelkader, Ghadeer, Khalid Elgazzar, and Alaa Khamis. Sensors 21.22 (2021): 7712.
6. Automotive Vehicle Safety by George A. Peters, Barbara J. Peters, SAE 2002.
7. Bosch Hand Book, 3rd Edition, SAE, 1993.

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

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) Scheme in light of NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU602C	DE	MATERIAL HANDLING AND STORAGE SYSTEMS	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):

Students will be able to (A) acquired the necessary expertise in material handling and storage systems and optimize efficient material movement. (B) They will be capable of applying their knowledge to solve practical challenges and (C) contribute to streamlined operations and enhanced productivity.

Course Outcomes (COs):

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

1. To familiarize students with the fundamentals of material handling, including the principles, importance, and key concepts.
2. To introduce students to common material handling systems, both traditional and automated, and equip them with the knowledge of selecting and implementing appropriate systems.
3. To enable students to understand the various storage systems used in industrial and manufacturing sectors, including their design considerations, capacity planning, and optimization.
4. To empower students to demonstrate their understanding of material handling and storage systems through various case studies, allowing them to analyze real-world.

Syllabus

Unit I

Introduction: Definitions, Objectives, Cost of handling, Design handling, Material factors, Automated material handling systems, Scope of material handling, Application of material handling equipment, Modern trends in material handling.

Unit II

Common Material Handling Equipment's: Concepts of unit loads, Material handling and storage equipment's operation and selection, Containers, Pallets, Conveyor systems, Industrial trucks, Wagon tippers, Transporters, Stackers, Reclaimers, Silos & hoppers and their accessories, Ropeways, Ship loaders, Cable cranes, Container handling systems, Electric lifts & Hoists, EOT cranes, Elevators, Material handling equipment's in steel mills, Power plants, Mines, Automobile and transport industries, Large scale constructions etc.



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



Registrar

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) Scheme in light of NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU602C	DE	MATERIAL HANDLING AND STORAGE SYSTEMS	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.

Unit III

Automated Material Handling: Material handling function; Types of material handling equipment. Analysis of material handling Systems; consideration of material and movement conditions, material handling analysis techniques, Design of the System: effect of plant layout, principles of material handling, Conveyor Systems: types of conveyors, quantitative relationships and analysis of conveyor systems, Automated guided vehicle systems (AGVS): types of AGVS, applications, vehicle guidance and routing, traffic control and safety, system management, quantitative analysis of AGV Systems.

Unit IV

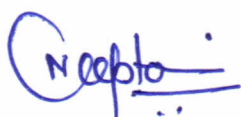
Storage Systems: Storage System Performance: Types of materials stored in factory, storage capacity, system throughput, storage transactions, utilization, uptime reliability; Automated Storage / Retrieval Systems (AS/RS); Definition, important categories of automated storage /retrieval system, basic components of an AS /RS, AS/RS controls, special features and applications.

Unit-V

Case Studies: Case study related to manufacturing and industrial practices.

Reference Books:

1. "Automation, Production Systems and CIM", by Groover. M. P., Prentice Hall India, 2007
2. "Manufacturing Automation", by Morris A. Cohen, Uday M. Apte., Irwin, Chicago, 1997.
3. "Robots and Manufacturing Automation", by Ray Asfahl. C., 2nd edition, John Wiley & Sons, New York, 1999.
4. "Facilities planning", by James A. Tompkins., John wiley & Sons Inc, 1994
5. "Principles of layout and material handling", by James. M. Apple, Ronald press, 1977.
6. "Introduction to Materials Handling" by Siddhartha Ray, New Age International Private Limited; Nineteen edition, 2017.



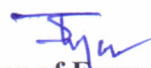
Chairperson

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



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 in Mechanical Engineering
(2024 - 2028)

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*				
BTME602A	DSE	ADVANCED PRODUCTION TECHNOLOGY	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 Objectives:

The primary objective of the course is to describe and develop knowledge of (A) advanced production technology and Jigs & Fixtures (B) Gear manufacturing, (C) Group technology and flexible manufacturing system,

Course Outcomes:

After completion of this course:

1. Students will be able to describe concepts of unconventional production methods.
2. Students will be able to describe advanced Jigs and fixtures used for production.
3. Students will be able to describe the principles of gear manufacturing and its nomenclature.
4. Students will be able to understand the working principles of flexible manufacturing system.
5. Students will be able to understand the concepts and importance of group technology.

Syllabus

Unit-I

(10 Hrs)

Advanced Production Technology: Need for advanced production technology; Classifications of Unconventional or advanced Manufacturing Processes; Construction and working principal of unconventional machining processes such as USM, WJM, AJM, Chemical Machining, Electrolytic Grinding, EDM, LBM, EBM, Plasma Arc Cutting etc. and applications & limitations.

Unit-II

(10 Hrs)

Jigs and Fixtures:

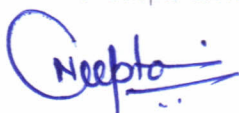
Definition, Principles of location, locating method and devices; principles of clamping, clamping devices; drilling jigs and its types; drill bushes, fixture and economics; types of fixture; milling, grinding, broaching, assembly fixtures indexing jig and fixtures, indexing devices.

Unit-III

(9 Hrs)

Gear Manufacturing

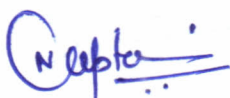
Types of gears; nomenclature of spur and helical gears; Gear generating and forming processes: concept, differences and applications, working and application of gear milling, gear hobbing and



Chairperson

Board of Studies

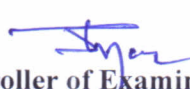
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



Chairperson

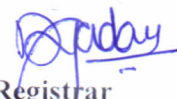
Faculty of Studies

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



Controller of Examinations

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



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 in Mechanical Engineering
(2024 - 2028)

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*				
BTME602A	DSE	ADVANCED PRODUCTION TECHNOLOGY	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 shaping machines; Nomenclature of gear hob and gear shaping cutter; Gear Cutting parameters for commonly used materials and work-piece; Gear finishing processes- shaving & grinding.

Unit-IV:

(8 Hrs)

Flexible Manufacturing System: definition, types of FMS and applications; concept of flexibility, need of flexibility, types of flexibilities and its measurement; economic justification for FMS; Functional requirements for FMS equipment's.

Unit-V

(8 Hrs)

Group Technology: GT concept, advantages of GT; part family formation-coding and classification Systems; part-machine group analysis; Production flow analysis; Methods for cell formation; FMS related problem and Solution Methodology.

Text and Reference Book:

1. "Advanced Manufacturing Processes" by V. K. Jain, Allied Publishers, 2nd Edition, 2016.
2. "Production Engineering" by P. C. Sharma, S. Chand Publishing, Latest Revised Edition (Reprint 2022).
3. "Production Technology: Manufacturing Processes, Technology and Automation" by R. K. Jain, Khanna Publishers, Latest Revised Edition (Reprint 2023).
4. "Modern Machining Processes" by P. C. Pandey and H. S. Shan, Tata McGraw-Hill Education, 1st Edition (Reprint 2020).
5. "Automation, Production Systems and Computer-Integrated Manufacturing" by Mikell P. Groover, 5th Edition, Pearson, 2024.
6. "Manufacturing Technology" by P. N. Rao, Vol. I & II, 5th Edition, McGraw Hill, 2024.
7. "Workshop Technology" by W. A. J. Chapman, Part I, II & III, 5th Edition.
8. "Elements of Workshop Technology" by S. K. Hajra Choudhury et al., 15th Edition, 2023.
9. "Fundamentals of Metal Cutting and Machine Tools" by B.L. Juneja and G.S. Sekhon, New Age International, 2003.
10. "Fundamentals of Modern Manufacturing: Materials, Processes and Systems" by Mikell P. Groover, John Wiley & Sons, 7th Edition, 2020.
11. "Jigs and Fixture Design Manual" by Erik K. Henriksen, Industrial Press, 2nd Edition



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



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 NEP2020
B. Tech Automobile Engineering
(2024 - 2028)

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*				
BTAU602B	DE	TOTAL QUALITY MANGEMENT	60	20	20	0	0	3	0	0	0

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):

Students will be able to apply (A) Total Quality Management (TQM) principles to foster a culture of quality excellence within organizations, (B) promoting a proactive approach to quality control and customer satisfaction, (C) identifying areas for improvement to achieve higher efficiency.

Course Outcomes (COs):

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

1. Student would be able to understand the need of Quality, and its concepts.
2. Student would be able to understand various available statistical tools of quality monitoring.
3. Student would be able to analyses basics of Quality Management and able to understand various management tools and techniques.
4. Students would be able to understand the statistical and economical design issues associated with the monitoring tools.

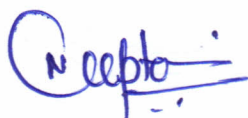
Syllabus

Unit I

Introduction of Statistical quality Control & TQM: Quality: Definition, need, evolution, The Meaning of Quality and Quality Improvement; Brief History of Quality Methodology; Statistical Methods for Quality Control and Improvement; Total Quality Management: quality philosophies (Contributions of Deming, Juran and Crosby, links between quality and productivity, quality costs legal aspects of quality implementing quality improvement).

Unit II

Methods and Philosophy of Statistical Process Control: Chance and assignable causes, Statistical Basis of the Control Charts (basic principles, choices of control limits, sample size and sampling frequency, rational subgroups, analysis of pattern on control charts, warning limits, ARL, sensitizing rules for control charts); Deming's Magnificent Seven Implementing SPC; An Application of SPC; Nonmanufacturing application of SPC.



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



Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) Scheme in light of NEP2020

B. Tech Automobile Engineering
(2024 - 2028)

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*				
BTAU602B	DE	TOTAL QUALITY MANGEMENT	60	20	20	0	0	3	0	0	0

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

Control Charts for Variables: Control Charts for $\bar{X}$ and R (statistical basis, development and use, estimating process capability; interpretation, the effect of non-normality on the chart, the OC function, and average run length); Control Charts for $\bar{X}$ and S; Control Chart for Individual Measurements; Applications of Variables Control Charts.

Unit IV

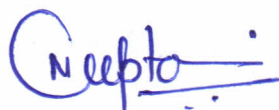
Inferences about Process Quality: Sampling distributions, estimation and confidence interval for process parameter(s), hypothesis testing on process parameter(s) and power analysis, Process Capability Ratios, Process Capability Analysis, Exponentially Weighted Moving Average Control Chart, Moving Average Control Chart

Unit V

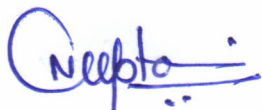
TQM Tools & Techniques: Seven traditional tools of quality, new management tools, Six-sigma: Concepts, methodology, application to manufacturing, service sector including IT, Bench marking: reason, process. FMEA, Just-In-Time, Kanban system MRP vs JIT system, Waste elimination, workers involvement through JIT. QFD, Taguchi quality loss function, Inspection: acceptance sampling, OC curve, producer and consumer risk, theoretical invalidation of AS, KP rule for stable and chaotic processes.

Reference Books:

1. "Statistical Quality Control" by E.L. Grant and R.S. Leavenworth, 6th edition, McGraw-Hill publisher, 1988.
2. "Principles of Quality Control", by Jerry Banks, Wiley publisher, 1989.
3. "Total Quality Management" by D. H. Besterfield, Pearson Education Asia, Third Edition, Indian Reprint, 2006.
4. "The Management and Control of Quality" by J. R. Evans and W. M. Lindsay; South-Western (Thomson Learning), Sixth Edition, 2005.
5. "Total Quality Management" by Naidu, Babu and Rajendran; New age international pub; First Edition Reprint, 2013



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



Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) Scheme in light of NEP-2020
B. Tech in Mechanical/Automobile Engineering
(2024 -2028)

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*				
BTCSME501	DSE	ARTIFICAIL INTELLIGENCE AND MACHINE LEARNING	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)

This course provides a fundamental knowledge of (A) Artificial Intelligence (AI) (B) Machine Learning (ML) and (C) Mathematics and algorithms related to AI & ML.

Course Outcomes (COs)

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

1. Understand the basic concepts of Artificial Intelligence and search techniques.
2. Apply knowledge representation and logical reasoning.
3. Understand the basic concepts of Machine Learning.
4. Apply linear and logistic regression models.
5. Apply machine learning algorithms and neural networks to solve engineering problems.

Syllabus

Unit – I

(8 Hrs)

Introduction to AI: Definition of AI, types of AI techniques, problem solving using state space search, applying heuristics, hill climbing, search using BFS, DFS.

Unit – II

(8 Hrs)

Knowledge Representation and Logic Programming : Representing knowledge as a rules, representing simple facts in logic, computable functions and predicates, procedural vs declarative knowledge, forward vs backward reasoning, logical programming-predicates logic.

Unit – III

(10 Hrs)

Introduction to Machine Learning and basic concepts: Definition, scope and limitations of ML, basic concepts of regression, probability, statistics and linear algebra for machine learning, basic concepts of convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.

Unit – IV

(10 Hrs)

Linear Regression: Model representation for single variable, single variable cost function, gradient decent for linear regression, gradient decent in practice.

Logistic Regression: Hypothesis representation, decision boundary, cost function, optimization, multi classification (one vs all), problem of over-fitting.

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

Registrar

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) Scheme in light of NEP-2020
B. Tech in Mechanical/Automobile Engineering
(2024 -2028)

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*				
BTCSME501	DSE	ARTIFICAIL INTELLIGENCE AND MACHINE LEARNING	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.

Unit-V

(9 Hrs)

Supervised and Unsupervised Learning: Discussion on clustering and classification algorithms, Naïve Bayes theorem, decision tree, SVM.

Introduction to Neural Network: Introduction, types of neural network, application in machine learning.

Textbooks:

1. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, 4th Edition, Pearson Education, 2021.
2. "Machine Learning with PyTorch and Scikit-Learn" by Sebastian Raschka, Yuxi (Hayden) Liu and Vahid Mirjalili, 2nd Edition, Packt Publishing, 2022.
3. "Introduction to Machine Learning with Python: A Guide for Data Scientists" by Andreas C. Müller and Sarah Guido, O'Reilly Media, 1st Edition (Latest Available Reprint).
4. "Machine Learning" by Tom M. Mitchell, McGraw-Hill Education, Latest Available Reprint.
5. "Artificial Intelligence" by Elaine Rich, Kevin Knight and Shivashankar B. Nair, 3rd Edition, McGraw-Hill Education, Latest Available Reprint.
6. "Artificial Intelligence for Engineers and Scientists" by John Paul Mueller and Luca Massaron, Wiley, 2021.
7. "Machine Learning in Mechanical Engineering" edited by J. Paulo Davim, De Gruyter, 2022.
8. "Artificial Intelligence in Manufacturing" edited by B. K. Choi and D. H. Noh, Springer, Latest Available Edition.

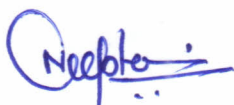
Reference Books:

1. "Machine Learning" by Tom M. Mitchell, McGraw-Hill Education, Latest Available Reprint.
2. "Pattern Recognition and Machine Learning" by Christopher M. Bishop, Springer, 2006 (Latest Available Reprint).
3. "Deep Learning" by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press, 2016.
4. "Artificial Intelligence in Mechanical Engineering" edited by C. H. Dagli, ASME Press, Latest Available Edition.
5. "Machine Learning in Advanced Manufacturing" edited by J. Paulo Davim, Elsevier, 2023.
6. "Machine Learning for Mechanical Engineers" edited by P. K. R. Maddikunta et al., CRC Press, 2024.



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



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 in Mechanical Engineering
(2024 - 2028)

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*				
BTME603	DCC	MECHANICAL VIBRATION	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)

This course provides a fundamental understanding of (A) Vibration and noise in mechanical system and machines (B) Design modifications to reduce the vibration and noise (C) increase the life of components and control noise.

Course Outcomes (COs)

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

1. Understand free and forced vibrations of single degree freedom systems.
2. Analyze balancing problems in rotating and reciprocating machinery.
3. Understanding causes, source and types of vibrations in machinery.
4. Gaining knowledge in sources and measurement standard of noise.
5. Ability to design and develop vibrations control systems.

Syllabus

Unit – I

(10 Hrs)

Fundamental Aspects of Vibrations: Definition of Vibration, main causes, advantages and disadvantages; engineering applications of vibration and noise; vector method of representing harmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, work done by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier series analysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped and distributed parameter systems.

Un-damped Free Vibrations: Derivation of differential equation of motion: the energy method, the method based on Newton's second law of motion, and Rayleigh's method. Solution of differential equation of motion: Natural frequency of vibration. Systems involving angular oscillations: compound pendulum.

Unit – II

(9 Hrs)

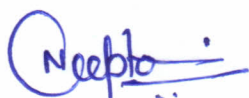
Damped Free Vibrations: Viscous damping: coefficient of damping; damping ratio; under damped, over damped and critically damped systems; logarithmic decrement; frequency of damped



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



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 in Mechanical Engineering
(2024 - 2028)

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*				
BTME603	DCC	MECHANICAL VIBRATION	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.

free vibration; Coulomb or dry friction damping; frequency, decay rate and comparison of viscous and Coulomb damping; solid and structural damping; slip or interfacial damping.

Unit – III

(9 Hrs)

Harmonically excited Vibration: One degree of freedom, forced harmonic vibration vector representation of forces; excitation due to rotating and reciprocating unbalance; vibration Isolation, force and motion transmissibility; absolute and relative motion of mass (Seismic Instruments).

Whirling Motion and Critical Speed: Whirling motion and Critical speed: Definitions and significance. Critical - speed of a vertical, light - flexible shaft with single rotor: with and without damping. Critical speed of a shaft carrying multiple discs (without damping), Secondary critical speed.

Unit – IV

(9 Hrs)

Systems With Two Degrees of Freedom: Un-damped free vibration of 2 d.o.f and Principal modes of vibration; torsion vibrations; Forced, Un-damped vibrations with harmonic excitation; Coordinate coupling; Dynamic vibration absorber; torsion Vibration Absorber; Pendulum type of dynamic vibration.

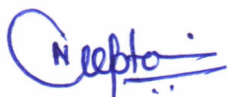
Unit-V

(8 Hrs)

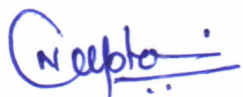
Vibration Control: Sources of vibration and methods of vibration reduction; vibration control through structural design, material selection, localized mass addition, damping and resilient isolation; vibration isolation; vibration absorbers; active and passive vibration control; machine vibration condition monitoring and fault diagnosis.

Textbooks:

1. "Theory of Vibrations with Applications" by W.T. Thomason, M.D. Dahleh and C. Padmanabhan, Pearson, 2011.
2. "Textbook of Mechanical Vibrations", by Dukikipati RV Srinivas J; Publisher PHI, 2017.
3. "Mechanical Vibrations" by S.S. Rao, Pearson, 2018.



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



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 in Mechanical Engineering
(2024 - 2028)

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*				
BTME603	DCC	MECHANICAL VIBRATION	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.

Reference Books:

1. "Mechanical Vibrations and Noise Engineering", by Ambekar A.G; Publisher: PHI, 2013.
2. "Element of Vibration Analysis", by Meirovitch Leonard Publisher: TMH, 2010
3. "Mechanical Vibrations", by Kelly SG and kudari SK; Publisher: Schaum Series; TMH, 2011.
4. "Mechanical Vibrations" by G.K. Grover, Nem Chand & Bros, 2009.
5. "Vibrations and waves in continuous mechanical systems" by P. Hagedorn and A. Das Gupta, John Wiley, 2018.

List of Experiments

1. To find out effect of load on natural frequency of vibrations of a lever pin supported at one end carrying adjustable load on a vertical screwed bar and spring supported at some intermediate point (i) When the dead weight of rods is neglected and (ii) when their dead weight is taken into account
2. To find out frequency of damped free vibration and rate of decay of vibration-amplitude in the system
3. To find out natural frequency and damped free frequency of a torsion pendulum and, hence to find out coefficient of damping of the oil
4. To observe the phenomenon of whirl in a horizontal light shaft and to determine the critical speed of the shaft
5. To observe the mode shapes of a spring-connected, double pendulum and hence to demonstrate the phenomenon of beats.
6. To demonstrate the principle of tuned Un-damped Dynamic Vibration Absorber and to determine the effect of mass-ratio (of main and auxiliary mass) on the spread of the resulting natural frequencies
7. To take measurements of sound Pressure Level (SPL) and to carry out octave band analysis of a machine using Noise Level Meter



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



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 in Mechanical Engineering
(2024 - 2028)

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*				
BTME605	DCC	MACHINE DESIGN II	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)

To develop the knowledge and skills required for the design and analysis of machine elements, metal working tools and dies, jigs and fixtures, gauges, gears, and I.C. engine components by applying engineering design principles, material selection, and relevant design standards.

Course Outcomes (COs)

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

1. Students will be able to understand the basic concepts of machine design, materials, and theories of failure.
2. Students will be able to design basic metal working tools and dies.
3. Students will be able to design jigs, fixtures, gauges, and moulds for manufacturing applications.
4. Students will be able to design gears and I.C. engine components.
5. Students will be able to apply machine design principles in the design of machine elements.

Syllabus

Unit – I

(10 Hrs)

Introduction to Machine Design: Philosophy of machine design; design procedure; design considerations; material selection for machine elements; IS coding of steels and cast irons; simple and combined stresses in machine elements; theories of failure; factor of safety.

Limits, Fits and Surface Engineering: Limits, tolerances and fits; types of fits and tolerances; design considerations for clearance, transition and interference fits; surface finish, surface roughness and their significance in machine design.

Unit – II

(10 Hrs)

Design of Metal Working Tools and Dies: Introduction to metal working tools and dies; design of press working tools; design of shearing, blanking, piercing and compound dies; design principles of bending, forming and deep drawing dies; tooling and design principles for forging dies, including drop forging and upset forging; fundamentals of rolling and roll pass design; selection of die materials and standard die components.

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

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 in Mechanical Engineering
(2024 - 2028)

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*				
BTME605	DCC	MACHINE DESIGN II	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.

Unit – III

(10 Hrs)

Design of Jigs, Fixtures, Gauges and Moulds: Fundamentals and design principles of jigs and fixtures; principles of location and clamping; locating and clamping devices; drilling jigs and drill bushes; design of milling, grinding, broaching and assembly fixtures; indexing jigs, fixtures and indexing devices; economics of jigs and fixtures; design principles of limit gauges for dimensional and geometric tolerances; design of moulds for plastic and rubber components, including compression, transfer and blow moulds.

Unit – IV

(10 Hrs)

Gear Design: Classification of gears; law of gearing; gear terminology; design of spur, helical, bevel and worm gears; Lewis and Buckingham equations; force analysis; dynamic load and wear considerations; selection of gear materials and design considerations

Design of Cylinder and Piston: Material selection for cylinder and piston; design of cylinder, piston, piston pin and piston rings; piston friction, piston slap and lubrication; failure modes and design considerations of piston assembly.

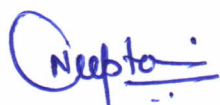
Unit-V

(10 Hrs)

Design of Connecting Rod and Crankshaft: Selection of materials for connecting rod and crankshaft; determination of optimum connecting rod length; design of small end, big end, shank and big end cap bolts; design consideration and failure analysis of connecting rod; balancing of reciprocating and rotating masses in I.C. engines; significance of firing order; design of crankshaft under combined bending and torsional loads; balancing weight calculations and design considerations.

Text and Reference Books:

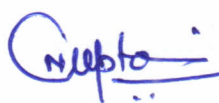
1. "Design of Machine Elements" by V. B. Bhandari, McGraw Hill Education, 4th Edition, 2021.
2. "Machine Design" by P. C. Gope, PHI Learning, Latest Edition.
3. "Machine Design" by R. S. Khurmi and J. K. Gupta, S. Chand Publishing, Latest Revised Edition.
4. "Design of Jigs, Fixtures and Press Tools" by K. Venkataraman, New Age International Publishers, Latest Edition.



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



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 in Mechanical Engineering
(2024 - 2028)

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*				
BTME605	DCC	MACHINE DESIGN II	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.

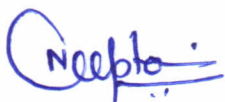
5. "Tool Design" by Cyril Donaldson, George H. LeCain and V. C. Goold, McGraw-Hill Education, 4th Edition.
6. "Fundamentals of Metal Cutting and Machine Tools" by B. L. Juneja, G. S. Sekhon and Nitin Seth, New Age International Publishers, Latest Edition.
7. "Machine Design" by Sadhu Singh, Khanna Publishers, Latest Revised Edition.
8. "Automobile Engineering (Vol. I & II)" by Kripal Singh, Standard Publishers Distributors, 11th Edition, 2014.

Reference Books:

1. "Shigley's Mechanical Engineering Design" by Richard G. Budynas and J. Keith Nisbett, McGraw Hill Education, 11th Edition, 2020.
2. "Machine Elements in Mechanical Design" by Robert L. Mott, Pearson Education, 6th Edition, 2020.
3. "Handbook of Gear Design" by G. M. Maitra, McGraw Hill Education, 2nd Edition.
4. "Vehicular Engine Design" by Kevin Hoag and Brian Dondlinger, Springer, 2nd Edition, 2015.
5. "Manufacturing Engineering and Technology" by Serope Kalpakjian and Steven R. Schmid, Pearson Education, 8th Edition, 2020.
6. "Jigs and Fixture Design Manual" by Erik K. Henriksen, Industrial Press, Latest Edition.

List of Experiments

1. To study the design procedure, material selection, theories of failure, limits, fits and tolerances used in machine design.
2. To design a blanking or piercing die for a given sheet metal component.
3. To design a bending or deep drawing die for a given component.
4. To design a drilling jig for a given workpiece.
5. To design a milling fixture for a given workpiece.
6. To design a limit gauge for a given component based on specified tolerances.
7. To design a spur gear and determine the forces acting on the gear teeth.
8. To design a piston and piston pin for an I.C. engine.
9. To design a connecting rod for an I.C. engine.
10. To design a crankshaft subjected to combined bending and torsional loads.



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



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 NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*					
BTAU602	DCS	CHASSIS AND BODY ENGINEERING	60	20	20	30	20	3	0	2	4	

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

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

Course Educational Objectives (CEOs):

To provide students with fundamental knowledge of automotive chassis, body, steering, suspension, braking, ergonomics, safety systems, and emerging automotive technologies for the analysis and design of modern automobiles.

Course Outcomes (COs):

After the successful completion of this course

1. Explain the construction and functions of automotive chassis, frames and vehicle body.
2. Explain the working principles of axle, steering, wheel, tyre and suspension systems.
3. Describe the construction and operation of automotive braking systems.
4. Apply ergonomic principles and vehicle safety features in automobile design.
5. Explain the applications of modern automotive technologies such as regenerative braking, ADAS, GPS, IoT and Artificial Intelligence (AI) in automobiles

Syllabus

Unit I

Automotive Chassis: Definition; chassis layout; types of chassis; chassis components; chassis classification; types of automotive frames (Ladder, Backbone, Space Frame, Monocoque and Semi-monocoque); construction and functions of frames; loads acting on vehicle frame; frame cross-sections; materials for chassis frames; frame diagnosis and service; wheelbase, wheel track and chassis overhang.

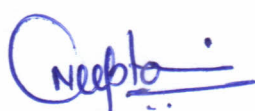
Vehicle Body: Vehicle Body: Classification and types of vehicle bodies; integral (monocoque) body construction; body structural requirements; body loads under static, acceleration and braking conditions; body materials;

Unit II

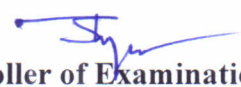
Axle & Steering System: Functions, construction & Types of Front Axles and Stub Axles; Ackerman's Steering Mechanisms; Steering linkages & layout; Types of steering gear boxes; Power


Chairperson

Board of Studies
 Shri Vaishnav Vidyapeeth
 Vishwavidyalaya, Indore


Chairperson

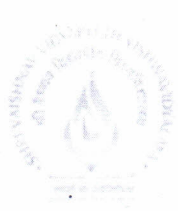
Faculty of Studies
 Shri Vaishnav Vidyapeeth
 Vishwavidyalaya, Indore


Controller of Examinations

Shri Vaishnav Vidyapeeth
 Vishwavidyalaya, Indore


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 NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU602	DCS	CHASSIS AND BODY ENGINEERING	60	20	20	30	20	3	0	2	4

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

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

assisted steering; Electronic steering; Four-wheel steering, Front wheel Geometry namely- Castor, Camber, Kingpin inclination, toe-in and toe-out, Condition for true rolling motion, center point steering, directional stability of vehicles, under-steer, over-steer.

Unit III

Wheel & Tyre: Different types of wheels and rims and their constructional details; Forces acting on wheels, construction of wheel assembly, types- spoke, disc & built-up wheels; Different Types of Tyers and their constructional details, tyre specifications and material properties of tyres & tubes, Static & rolling properties of tyres, types of tyre-wear & their causes; tyre rotation.

Suspension System: Need for Suspension System; Types of Suspension Springs, Constructional details and characteristics of Single Leaf, Multi-Leaf, Coil, Torsion bar; Independent Suspension, Pneumatic suspension; Hydraulic suspension; Shock Absorbers -liquid & gas filled and Constructional details.

Unit IV

Braking System: Principle of braking; classification; Drum brake, Disc brake, Parking brake - theory, principle and construction. Stopping Distance Time and Braking Efficiency, Effect of weight transfer during braking, Hydraulic Braking, Mechanical Braking, Pneumatic Braking, Power-Assisted Braking- theory, vacuum-booster basics, hydraulic-booster basics, Anti-Lock braking system; Electronic Brake Force Distribution (EBD); Electronic Stability Control (ESC); Regenerative Braking (EV).

Unit V

Ergonomic: Introduction of ergonomics; anthropometric dimensions of standard occupant; Concept of H-point referencing, interior design for ergonomics and comfort, seat design for ride comfort, suspension seats, split frame seating, back passion reducers; dash board instruments, pedal controls and electronic displays.

Vehicle Safety: Safety aspects in design, Types of safety (Active and Passive), Safety features: overview of requirement for occupant protection (frontal, side, rear and rollover impact) and

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

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 NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU602	DCS	CHASSIS AND BODY ENGINEERING	60	20	20	30	20	3	0	2	4

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

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

pedestrian safety, Airbags and Seatbelts; Visibility: Regulation, Driver's visibility, Methods of improving visibility, Introduction of crash test, Chassis and body alignment test; Autonomous Emergency Braking; Advanced Driver Assistance Systems (ADAS); parking assist system; Global Positioning System (GPS) and navigation system; Internet of Things (IoT) and Artificial Intelligence (AI) in automobiles.

Text Books:

1. "Automobile Engineering Vol.-1" by Kripal Singh, Standard Publishers, 2000.
2. "A Text-Book of Automobile Engineering" by R.K. Rajput, Laxmi Publications Private Limited, 2014.
3. "Automotive Chassis" by Heldt. P. M.- Chilton Co., New York- 1990
4. "Vehicle Body Engineering", by Jnusz Pawlowski, Publisher: Business books limited, 1970.
5. "An Introduction to Modern Vehicle Design", by J H Smith Publisher: Butterworth-Heinemann, 2001.
6. "Motor Vehicle Structure: Concepts and Fundamentals", by J Brown, A J Roberstson, S Serphento, Publisher: Butterworth-Heinemann, 2002.
7. "Advanced Vehicle Technology", by Heinz Heizler, Publisher: Butterworth-, London, 2002.
8. "Ergonomics in Automotive Design", by V D Bhinse, Publisher: CRC Press, 2011.
9. "Handbook of Automotive Body and Systems Design", by John Fenton Publisher: Wiley India, 2013.
10. "Handbook of Automotive Body Construction and Design Analysis", by John Fenton, Publisher: Wiley India, 1998.

References Books:

1. "Mechanics of Road Vehicles" by Steed W - Illiffe Books Ltd., London- 1960
2. "Motor Vehicles", by Newton Steeds and Garrot- Butterworths, London- 2000.
3. "Mechanism of the Car", by Judge A.W Chapman and Halls Ltd., London- 1986
4. "Steering, Suspension and tyres", by Giles.J.G- Iiiffe Book Co., London- 1988.
5. "Automotive Chassis and Body", by Crouse W.H- McGraw-Hill, New York- 1971.



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



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 NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU602	DCS	CHASSIS AND BODY ENGINEERING	60	20	20	30	20	3	0	2	4

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

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

List of Experiments:

1. Study of automotive chassis, frame types and vehicle body construction.
2. Study of front axle, stub axle and steering geometry (Castor, Camber, Kingpin Inclination, Toe-in and Toe-out).
3. Study and demonstration of steering systems and steering gear mechanisms.
4. Study of wheel assembly, tyre construction, tyre specifications and tyre wear patterns.
5. Study of leaf spring, coil spring, torsion bar and shock absorbers.
6. Study of independent and rigid axle suspension systems.
7. Study and demonstration of drum brake, disc brake and parking brake mechanisms.
8. Study of hydraulic braking system and Anti-lock Braking System (ABS).
9. Study of vehicle ergonomics, dashboard instruments, seating arrangement and H-point referencing.
10. Study of vehicle safety systems including airbags, seat belts, ADAS, Electronic Stability Control (ESC) and regenerative braking (demonstration/video-based if hardware is unavailable).

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

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 in Mechanical Engineering
(2028 - 2028)

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*				
BTME606	AESE	SIMULATION OF MECHANICAL SYSTEM LAB	0	0	0	0	50	0	0	2	1

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

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

Course Educational Objectives (CEOs)

To develop students' ability to create CAD models, perform assembly design, and analyze mechanical systems using simulation and CAE tools for engineering applications.

Course Outcomes (COs)

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

1. Create CAD models, engineering drawings, and mechanical assemblies.
2. Simulate the motion of mechanical systems and mechanisms.
3. Perform assembly validation and design analysis.
4. Conduct structural and thermal analysis using CAE tools.
5. Evaluate fatigue life and optimize mechanical designs through simulation.

Syllabus

Unit – I

(6 Hrs)

CAD Modelling and Assembly Design: Introduction to CAD-based simulation of mechanical systems; overview of CAD software environment; parametric modelling of mechanical components; creation of 3D models; engineering drawings with dimensions and annotations; assembly modelling; application of assembly constraints; exploded views and assembly animations.

Unit – II

(6 Hrs)

Mechanical System Modelling and Motion Simulation: Introduction to mechanical system simulation; mechanism modelling; kinematic constraints and joints; motion simulation of slider-crank mechanism; four-bar linkage mechanism; displacement, velocity and acceleration analysis; simulation of gear pairs and cam-follower mechanisms.

Unit – III

(6 Hrs)

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

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 in Mechanical Engineering
(2028 - 2028)

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*				
BTME606	AESE	SIMULATION OF MECHANICAL SYSTEM LAB	0	0	0	0	50	0	0	2	1

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

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

Assembly Validation and Design Analysis: Interference detection and collision analysis; mass property analysis; centre of gravity and moment of inertia calculations; design verification of mechanical assemblies; interpretation of simulation results.

Unit – IV

(6 Hrs)

Structural and Thermal Simulation: Introduction to CAE and finite element based simulation; preprocessing, meshing and boundary conditions; static structural analysis; stress, strain and deformation analysis; thermal analysis of mechanical components; interpretation of analysis results.

Unit-V

(6 Hrs)

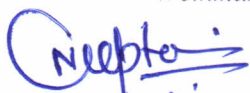
Fatigue Analysis and Project Work: Introduction to fatigue analysis; fatigue loading and failure criteria; estimation of fatigue life and factor of safety; optimization of design parameters; modelling, assembly and simulation of mechanical systems through mini projects.

Textbooks:

1. "Modeling, Analysis and Control of Dynamic Systems" by W. J. Palm, John Wiley, 1999.
2. "Modeling of Dynamic Systems" by Lennart Ljung and Torkel Glad, Prentice Hall, 2016.
3. "Mathematical Modeling for Design of Machine Components", by Bhonsle, S.R., and Weinmann, K.J., Prentice Hall, 1999.
4. "Engineering Design with SolidWorks" by James D. Bethune, Pearson Education, Latest Edition.
5. "Creo Parametric for Designers" by Prof. Sham Tickoo, CAD/CIM Technologies, Latest Edition.
6. "Finite Element Analysis Using ANSYS" by S. S. Rao, Elsevier, Latest Edition.

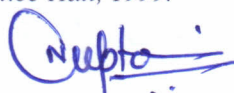
Reference Books:

1. "Finite Element Analysis: Theory and Application with ANSYS" by Saad A. Ragab and S. E. Bayoumi, CRC Press, Latest Edition.
2. "ANSYS Workbench Tutorial" by Klaus-Jürgen Bathe / Practical ANSYS Guide, Latest Edition.
3. "Mathematical Modeling for Design of Machine Components" by S. R. Bhonsle and K. J. Weinmann, Prentice Hall, 1999.



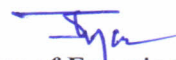
Chairperson

Board of Studies
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



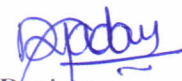
Chairperson

Faculty of Studies
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



Controller of Examinations

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



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 in Mechanical Engineering
(2028 - 2028)

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*				
BTME606	AESE	SIMULATION OF MECHANICAL SYSTEM LAB	0	0	0	0	50	0	0	2	1

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

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

4. "CATIA V5 for Designers" by Prof. Sham Tickoo, CAD/CIM Technologies, Latest Edition (Only if CATIA is used in lab).

List of Experiments

1. To create 3D models of machine components using CAD software.
2. To prepare detailed engineering drawings of machine components with necessary dimensions and annotations.
3. To create assemblies of machine components using standard assembly constraints.
4. To perform interference detection and mass property analysis of mechanical assemblies.
5. To generate exploded views and assembly animations of mechanical systems.
6. To simulate the motion of a slider-crank mechanism and analyze its kinematic behaviour.
7. To simulate the motion of a four-bar linkage mechanism and analyze displacement, velocity and acceleration.
8. To simulate the motion of gear pairs and cam-follower mechanisms.
9. To perform static structural analysis of mechanical components and evaluate stress, strain and deformation.
10. To perform thermal analysis of mechanical components under specified boundary conditions.
11. To perform fatigue analysis of mechanical components and estimate fatigue life and factor of safety.
12. Mini Project: Modelling, assembly and simulation of a mechanical system.

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

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 NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU607	SEC	VEHICLE ELECTRICAL AND ELECTRONICS LAB	0	0	0	0	50	0	0	2	1

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

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

Course Educational Objectives (CEOs):

Students will gain (A) hands-on expertise in automotive electrical systems, including batteries, alternators, starters, and sensors, (B) allowing them to diagnose and troubleshoot vehicle components effectively and (C) ensure safe and reliable automotive performance.

Course Outcomes (COs):

After learning the course, the students should be able to:

1. Familiarize students with automotive batteries and accessories, enabling them to understand their construction and working principles.
2. Develop practical skills in analyzing and troubleshooting automotive electrical circuits using multimeters, oscilloscopes, and diagnostic tools.
3. Understand the fundamentals of charging systems in vehicles, including alternators, voltage regulators, and their role in maintaining battery charge and electrical power supply.
4. Gain proficiency in using various automotive sensors and activators and understanding their applications in vehicle control systems.

Syllabus

Unit-I

Batteries and Accessories: Principle and construction of lead acid battery; characteristics of battery, rating capacity and efficiency of batteries, various tests on batteries; maintenance and charging.

Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods, horn, wiper system and trafficator.

Unit-II

System Engineering: Condition at starting, behavior of starter during starting, series motor and its characteristics; principle and construction of starter motor, working of different starter drive units, care and maintenances of starter motor, starter switches.

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

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 NEP2020

B. Tech in Automobile Engineering

(2024 - 2028)

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*				
BTAU607	SEC	VEHICLE ELECTRICAL AND ELECTRONICS LAB	0	0	0	0	50	0	0	2	1

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

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

Unit-III

Charging System: Generation of direct current, shunt generator characteristics, armature reaction, third brush regulation, cutout. Voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers, new developments.

Unit-IV

Fundamentals of Automotive Electronics: Current trends in automotive electronic engine management system; electro-magnetic interference suppression, electromagnetic compatibility, electronic dashboard instruments, onboard diagnostic system, security and warning system

Unit-V

Sensors and Activators: Types of sensors: sensor for speed, throttle position, exhaust oxygen level, manifold pressure, crankshaft position, coolant temperature, exhaust temperature, air mass flow for engine application. Solenoids, stepper motors, relay.

Reference Books:

1. "Understanding Automotive Electronics" by Bechhold Publisher SAE, 1998.
2. "Automobile Electrical Equipment" by Crouse W.H, Publisher: McGraw-Hill Book Co., Inc., New York, 3rd edition, 1986.
3. "Modern Electrical Equipment of Automobiles" by Judge A.W, Publisher: Chapman & Hall, London, 1992.
4. "Automotive Electrical Equipment" by Kholi. P. L Publisher: Tata McGraw-Hill Co., Ltd., New Delhi, 1975.
5. "Automotive Hand Book" by Robert Bosch Publisher: SAE (5th Edition), 2000.
6. "Internal Combustion Engines" by Ganesan. V. Publisher: Tata McGraw-Hill Publishing Co., New Delhi, 2003.

List of Experiments:

1. Testing battery voltage and state of charge using a multimeter and evaluating battery performance



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



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 NEP2020
B. Tech in Automobile Engineering
(2024 - 2028)

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*				
BTAU607	SEC	VEHICLE ELECTRICAL AND ELECTRONICS LAB	0	0	0	0	50	0	0	2	1

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

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

under different load conditions.

2. Diagnosing and replacing a faulty automotive battery.
3. Testing alternator output and voltage regulation under various engine speeds.
4. Diagnosing and rectifying alternator charging issues.
5. Checking starter motor operation and troubleshooting starting system problems.
6. Studying the construction and operation of an automotive alternator.
7. Investigating voltage regulation techniques in the charging system.
8. Understanding the role of a voltage regulator in maintaining battery charge.
9. Evaluating the output of various automotive sensors (temperature, pressure, etc.) using instrumentation.
10. Investigating the activation and response of actuators (solenoids, motors, etc.) under different conditions.
11. Calibrating and adjusting sensors in an engine control system.

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

Registrar

Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore