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

(2021-2025)

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*				
BTME302	DCC	PRODUCTION PROCESS	60	20	20	30	20	3	0	2	4

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

Course Educational Objectives (CEOs):

The primary objective of the course is to describe and develop knowledge of (A) Casting tools and techniques, (B) joining processes such as welding, brazing, soldering etc. (C) forming processes such rolling, extrusion, forging and sheet metal working (D) machining processes and metal cutting technology.

Course Outcomes (COs):

After completion of this course the students will be able to understand and describe the

1. Types of manufacturing processes and casting tools and methods.
2. Joining processes such as welding, brazing, soldering etc.
3. Machining processes, operations and metal cutting technology.
4. Forming processes such as rolling, extrusion, deep drawing, forging and sheet metal working.

Syllabus

Unit – I **(9 Hrs)**

Introduction: Definition, classification of manufacturing processes, importance of manufacturing.

Metal Casting Processes: Introduction to casting and foundry; basic principles of casting; pattern: functions of patterns, types of patterns, pattern allowances, materials used for patterns; pattern design considerations, core, core boxes; moulding: moulding materials, types of mouldings, moulding sand properties and testing, core sand and core making, gating system, runner and riser, pouring and feeding, degasification etc. in casting, various types of casting processes, casting defects.

Unit - II **(9 Hrs)**

Joining Processes: Classification of joining processes, principle of welding, soldering, brazing and adhesive bonding; Types of welding processes: arc welding and gas welding processes, TIG welding, MIG welding, spot welding, resistance welding, submerged arc welding, plasma arc welding, thermit welding, electron beam welding, laser beam welding, defects and inspection of welding joints, electrodes, weldability of metals, welding equipments, difference between welding, soldering and brazing.

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Unit - III **(9 Hrs)**

Rolling, Extrusion and Wire Drawing: Introduction, advantages of mechanical rolling processes, difference between hot and cold working, advantages and disadvantages of cold and hot working processes, types of rolling mills, rolling defects; extrusion of metals: types of extrusion processes, metal flow in extrusion, extrusion equipment & dies, defects and their remedies; wire drawing: classification, advantages, limitations and applications.

Unit – IV **(10 Hrs)**

Forging and Sheet Metal Working:

Forging: Introduction, classification of forging, open die and closed die forging, types of forging operations, types of forging presses, common forging defects

Sheet Metal Working: Sheet Metal properties, miscellaneous sheet metal working operations: shearing & slitting, punching, blanking, coining, piercing, trimming, perfecting, notching, lancing, embossing, stamping, rubber forming, stretch forming, curling, bending, drawing, deep drawing etc. press tool, types of dies used, force requirement, theory of shear, methods of force reduction, lubricants used, pressure and power requirements, defects and their remedies, slitting tools and shear blades.

Unit – V **(8 Hrs)**

Introduction of Metal Cutting and Machining Operations: Metal cutting tools, types of cutting tools and tool materials, single point and multipoint cutting tools and related terms, types of chips formed; working principles, main components and common operations of lathe machines, shaper and planer machines, milling, grinding and drilling machines

Text and Reference Books:

1. "Workshop Technology" by W. A. J. Chapman part I, II & III, 5th ed., 2001.
2. "Manufacturing Technology" by P. N. Rao, Vol. 1 and 2, 2016.
3. "Fundamentals of Machining and Machine Tools" by D.G. Boothroy and W.A. Knight, Marcel Dekker, NY, 2007.
4. "Production Technology" by R.K. Jain and S.C. Gupta, Khanna Publishers. 16th Edition, 2008.

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BTME302	DCC	**PRODUCTION PROCESS**	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. "Elements of Workshop Technology" by Hazra Chaudhary Vol I, II, 12th ed., 2007.
6. "Metal Cutting Theory and Practice" by Bhattacharya, New Central Book Agency, 2000.
7. "Principles of Metal Cutting" by G. Kuppuswamy, Universities Press, 2006.
8. "Fundamentals of Metal Cutting and Machine Tools" by B.L. Juneja and G.S. Sekhon, New Age International, 2010.

List of Experiments:

1. To study different types of patterns.
2. To study properties of casting sand and casting defects.
3. To prepare a mould using moulding sand and pattern.
4. To study various types of welding and welding defects.
5. To make a lap joint with the help of electric arc welding.
6. To make the lap joint with the help of TIG welding.
7. To study and prepare a job using resistance welding (spot welding).
8. To study various types of rolling mills.
9. To study various types of forging tools and operations.
10. To study various sheet metal operations.
11. To study various types of cutting tool and their geometry.
12. To study basic features of various metal cutting machinery and their operations.

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BTME303	DCC	STRENGTH OF MATERIALS	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):

(A)To gain knowledge of different types of stresses, strain and deformation induced in the mechanical components due to external loads. (B)To study the distribution of various stresses in the mechanical elements such as beams, shafts etc. (C) To study effect of various loading conditions of column and gain knowledge of theories of failure.

Course Outcomes (COs):

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

1. Define and memorize mechanical properties of material & select appropriate material for a given working Conditions.
2. Explain simple stresses, bending stress, shear stress, torsion stress, principle stresses, thin and thick cylinder, shaft, springs, columns and theories of failures.
3. Calculate and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
4. Design of shaft and pressure vessels.
5. Justify bending equation and torsion equation and use it to solve the numerical.

Syllabus

Unit – I **(8 Hrs)**

Introduction: Stress-Strain, uni-axial, bi-axial and tri-axial stresses, tensile & compressive stresses, shear stress, Stress Strain Diagram, Ratio, Modulus of elasticity, Modulus of rigidity, Bulk modulus, Factor of safety.

Unit – II **(9 Hrs)**

Simple & Compound Stresses: Deformation due to self-weight, bars of varying sections, composite sections, principle of superposition, strain energy, Transformation of stress and strain, principal stresses, normal and shear stress, Mohr's circle and its application to two and three dimensional analyses, Thermal Stress.

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BTME303	DCC	STRENGTH OF MATERIALS	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Unit – III **(10 Hrs)**

Bending and Deflection: Symmetric member, Deflection of beams, deformation and stress, bending of composite sections, Macaulay's method and Area moment method for deflection of beams

Unit – IV **(8 Hrs)**

Torsion: Torsion of circular shafts-solid and hollow, Strength of Shaft and composite shaft, combined bending and torsion, strain energy due to torsion.

Unit – V **(10 Hrs)**

Columns and Theories of Failure: Buckling load, Types of end conditions for column, Euler's column theory and its limitations, Rankine- Gordon Formula, Theories of failures: Maximum principal stress theory, Maximum principal strain theory, maximum shear stress theory; maximum strain energy theory, maximum shear strain energy theory; Application of theories to different materials and loading conditions.

Text and Reference Books:

1. Strength of Materials, Dr. R.K. Bansal, Lakshmi Publications, New Delhi, 2015
2. Strength of Materials, Basavarajaiah and Mahadevappa, Khanna Publishers, New Delhi, 2013
3. Mechanics of Materials, James M. Gere (5th Edition), Thomson Learning, 2005
4. Strength of Materials—S. Ramamrutham, Dhanpat Rai Pvt. Ltd.
5. Mechanics of Materials—S. S. Rattan, TMH Pvt. Ltd., 2010
6. Strength of Materials, Subramanyam, Oxford University Press, Edition 2005
7. Elements of Strength of Materials, Timoshenko and Young Affiliated East-West Press, 2012
8. Strength of Materials, Singer Harper and Row Publications, 2005
9. Mechanics of Structures—S. B. Junnarkar, Charotar Publication, 2015

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BTME303	DCC	**STRENGTH OF MATERIALS**	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.

10. Mechanics of Materials, B.C Punmia Ashok Jain, Arun Jain, Lakshmi Publications, New Delhi, 2014
11. Strength of Materials—W. Nash, Schaum's Outline Series, McGraw Hill Publication, 2014
12. Strength of Materials, S.S. Bhavikatti, Vikas Publishing House Pvt Limited, 2016

List of Experiments

1. Perform Brinell hardness tests to find BHN for given metallic material.
2. Perform Rockwell hardness tests to find RHN for given metallic material
3. Perform Izod/ Charpy impact test.
4. Perform Fatigue test.
5. Perform bending test.
6. Perform Torsion test.
7. To find tensile strength of given specimen by tensile test on MS and CI using UTM.
8. Perform Direct/cross Shear test on MS and CI by UTM.

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BTME304	DCC	ENGINEERING THERMODYNAMICS	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):

(A)To gain knowledge of Basic Concepts of thermodynamics. (B)To study of First law of Thermodynamics. (C)To gain knowledge of Second law of thermodynamics. (D)To gain knowledge of Entropy and Entropy. (E)To study of Gas Power cycles. (F)To study of Properties of gases and gas mixtures.

Course Outcomes (COs):

After learning the course, the students should be able to

1. Understand basic terms used in thermodynamics.
2. Understand laws of thermodynamics and its applications.
3. Comprehend the concept and applications of energy, entropy and exergy.
4. Understand various gas and vapor power cycles.
5. Understand the properties of gas mixtures.

Syllabus

Unit – I **(9 Hrs)**

Basic Concepts: Microscopic & macroscopic point of view, thermodynamic system and control volume, thermodynamic properties, processes and cycles, work and heat, Thermodynamic equilibrium, Quasi-static process, work transfer and heat transfer processes.

First law of Thermodynamics: First law for a closed system undergoing a cycle and change of state, energy, PMM1, first law of thermodynamics for steady flow process, steady flow energy equation applied to nozzle, diffuser, boiler, turbine, compressor, pump, heat exchanger and throttling process, filling and emptying process.

Unit – II **(8 Hrs)**

Second law of thermodynamics: Limitations of first law of thermodynamics, Kelvin-Planck and Clausius statements and their equivalence, PMM2, causes of irreversibility, Carnot theorem, corollary of Carnot theorem, thermodynamic temperature scale.

Unit - III **(9 Hrs)**

Entropy: Clausius theorem, property of entropy, inequality of Clausius, entropy change in an irreversible process, principle of increase of entropy, entropy change for non-flow and flow processes, third law of thermodynamics.

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BTME304	DCC	ENGINEERING THERMODYNAMICS	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 - IV **(9 Hrs)**

Energy: Energy of a heat input in a cycle, exergy destruction in heat transfer process, exergy of finite heat capacity body, exergy of closed and steady flow system, irreversibility and Gouy-Stodola theorem and its applications, second law efficiency.

Unit - V **(10 Hrs)**

Gas Power cycles: Recapitulation of Carnot, Otto and Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, air standard efficiency, mean effective pressure, brake thermal efficiency, relative efficiency, Brayton cycle, effect of reheat, regeneration, intercooling and turbine and compressor efficiency on Brayton cycle.

Properties of gases and gas mixtures: Avogadro's law, equation of state, ideal gas equation, Vander Waal's equation, reduced properties, law of corresponding states, compressibility chart, Gibbs-Dalton law, internal energy; enthalpy and specific heat of gas mixtures.

Text and Reference Books:

1. Engineering Thermodynamics by P.K. Nag, McGraw-Hill Education, 2010
2. Fundamentals of Thermodynamics by Borgnakke & Sonntag, 7th Ed. Wiley India (P) Ltd., 2015
3. Thermodynamics – Engineering Approach by Yunus Cengel & Boles, McGraw-Hill Education, 2010.
4. Engineering Thermodynamics by Gordon Rogers and Yon Mayhew, Pearson, 2014
5. Engineering Thermodynamics by Krieth, CRC Press, 2015
6. Engineering Thermodynamics by Jones and Dugan, PHI Learning Pvt. Ltd., 2012

List of experiments

1. Study of positive displacement work (PdV work) and Heat transfer for various processes.
2. Study of First Law of Thermodynamic.
3. Study of second Law of thermodynamic.
4. Determination of efficiency of Otto cycle.
5. Determination of efficiency of Diesel cycle.
6. Study of Properties of gases and gas mixtures.
7. Study of entropy of system.
8. Study of steady flow energy equation applied to nozzle, diffuser, boiler, turbine, compressor, pump, and heat exchanger and throttling process.

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BTME305	DCC	MACHINE DRAWING	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):

This course provides comprehensive knowledge of (A) production drawing, (B) assembly drawings and (C) orthographic Sectional views and use of (D) computer applications in production drawing.

Course Outcomes (COs):

On completion of the course the students will be able to:

1. Understand all drawing conventions, symbols and concepts of machine drawing Creation.
2. Convert functional specification of mechanical engineering parts and assembly requirements into manufacturing drawing in a manner consistent with standards.
3. Interpret manufacturing and assembly drawings and acquire skill in preparing production drawings pertaining to various designs.
4. Acquire knowledge of the applications of computers in design, parts creation, assembling and production drawing creation, mechanism and manufacturing activity.

Syllabus

Unit – I **(8 Hrs)**

Introduction of Machine Drawing and Drawing Conventions: Introduction, classification of machine drawings, principles of drawing, elements of drawing, types of machine drawing, Drawing standards, Drawing Instruments, sheet layout and title block, Application of types of lines, lettering and numbering, Sketching, Dimensioning, screw threads, screw fastening bolt, nut, washer, screw, locking arrangements of nuts, foundation bolts, keys, cotter-joints and pin joint, pipe joint and valves, Riveted joints and welded joints, shaft bearings, brackets and hangers, shaft coupling, clutches and brakes.

Drawing Conventions and Symbols: Conventional materials, Conventional breaks, Convention of rivets and bolts, welding conventions, Convention of roughness of surface, Convention of machine operation and parts, Convention of gear and gear transmission, convention of springs, Symbolic Representation of fasteners, Holes and bolts, profile section, pipe fittings and valve symbols, Electric symbol.

Unit – II **(8 Hrs)**

Production Drawing Elements and Assembly Drawings: Introduction, geometric tolerance

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BTME305	DCC	MACHINE DRAWING	0	0	0	0	50	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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types and representation, dimensional tolerance types and representation, Limits and fits, hole basis and shaft basis system of fits, surface roughness, indication of surface roughness, roughness value and grade symbol, Assembly concepts, introduction, types, sequence of preparing the assembly drawing, sectional views, convention in sectioning, bill of materials, plotting techniques.

Assembly drawing

Shaft joints: knuckle joint, cotter joints and types etc.

Keys & Shaft coupling: Muff, Flanged, Flexible, Universal and Oldham's coupling etc.

Pipe joint: Flanged joint, Socket and Spigot joint, Hydraulic joint, Union joint, Gland & Stuffing Box etc.

Bearing: Plummer block, Pedestal bearing etc.

Engine Parts: Steam engine, Piston, connecting rod, Stuffing box, cross head, crank shaft etc.

Unit – III **(8 Hrs)**

Orthographic Conversion, Sectional and Interpretation of Views: Principle and method of projection, orthographic projection, first angle, third angle, isometric, oblique and perspective projection, conversion of pictorial views into orthographic views illustrative problems,

Sectional views and Interpretation: Types of sectional views, full section, half section, partial section, removed section, revolved section, offset section, sectioning conventions. Reading of orthographic views, blue print reading, missing lines and views, identification of planes, illustrative problems.

Unit – IV **(8 Hrs)**

Production and Assembly Drawing Creation through CAD: Introduction to CAD, Why CAD Software, Scope, objective, benefit and limitations, CAD Interface, Coordinate system, Create Objects and Modify Object. Layers & Blocks, Text, Table & Dimensions, Introducing Printing, Plotting, and Layouts.

Drawing practice sheet: Indicate the surface roughness symbols, welding symbols, tolerances, all production drawing symbols and conventions in drawing practice sheets of AutoCAD Mechanical.

Parts Assembly, Visualization & Graphics standards: Assembly Creation methods, Parts Modeling & Representation, Assembly Constraints, Mechanism & Mechanism Analysis, Mass Properties, Data exchange standards; IGES STEP CALS DXF STL.

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BTME305	DCC	**MACHINE DRAWING**	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.

Reference Books:

1. Machine drawing- N.D. Bhatt. & V.M. Panchal, Charotar publishing house, 2015.
2. Machine Drawing & Design, Dr. K.K. Dwivedi & Dr. M. Pandey, Dhanpat Rai Publications, 2015
3. Machine drawing – P.S. Gill S.K. Kataria & Sons Delhi, 2016
4. Fundamentals of Machine Drawing by Sadhu Singh & Shah, PHI, 2014
5. Machine drawing – T. Jones., 2007.
6. Machine Design by-J.E. Shigly-McGraw Hill Publications, 2010.
7. Design of Machine Elements from V.B. Bhandari, TMH Publications, 2014
8. Introduction to Engineering Design, McGraw Hill, 2015
9. Mastering CAD George Omura with Brian Benton Autodesk, 2004
10. Machine Design – P.C. Sharma & D.K. Agrawal, Kataria & Sons Publications, 2014
11. Principles of Mechanical Design - R. Phelan – McGraw Hill Pub., 2011
12. Machine Design - An Integrated Approach Robert-L-Norton Published by Addison Wesley Longman, 2015
13. Machine Design, Theory & Practice – J. Michels Walter, E. Wilson Charles – Add MacMilan Publishers, New York, 2010

List of Experiments:

Various Drawing problems according to syllabus.

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 School of Management

Choice Based Credit System (CBCS) in Light of NEP-2020
BBA+MBA - II SEMESTER (2022-2026)

ML307 ENVIRONMENTAL MANAGEMENT AND SUSTAINABILITY

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*				
ML307	AECC	Environmental Management and Sustainability	60	20	20	0	0	4	0	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical: **C** - Credit; **AECC**- Ability Enhancement Compulsory Course

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

Course Objective

1. To create awareness towards various environmental problems.
2. To create awareness among students towards issues of sustainable development.
3. To expose students towards environment friendly practices of organizations.
4. To sensitize students to act responsibly towards environment.

Examination Scheme

The internal assessment of the students' performance will be done out of 40 Marks. The semester Examination will be worth 60 Marks. The question paper and semester exam will consist of two sections A and B. Section A will carry 36 Marks and consist of five questions, out of which student will be required to attempt any three questions. Section B will comprise of one or more cases / problems worth 24 marks.

Course Outcomes

1. The course will give students an overview of various environmental concerns and practical challenges in environmental management and sustainability.
2. Emphasis is given to make students practice environment friendly behavior in day-to-day activities.

COURSE CONTENT

UNIT I: Introduction to Environment Pollution and Control

1. Pollution and its types (Air, Water, and Soil): Causes, Effects and Control measures
2. Municipal Solid Waste: Definition, Composition, Effects
3. Electronic Waste: Definition, Composition, Effects
4. Plastic Pollution: Causes, Effects and Control Measures

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Board of Studies	Faculty of Studies	Shri Vaishnav Vidyapeeth	Shri Vaishnav Vidyapeeth
Shri Vaishnav Vidyapeeth	Shri Vaishnav Vidyapeeth	Vishwavidyalaya, Indore	Vishwavidyalaya, Indore
Vishwavidyalaya, Indore	Vishwavidyalaya, Indore		

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BBA+MBA - II SEMESTER (2022-2026)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
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UNIT II: Climate Change and Environmental Challenges

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer
3. Acid Rain
4. Nuclear Hazards

UNIT III: Environmental Management and Sustainable Development

1. Environmental Management and Sustainable Development: An overview
2. Sustainable Development Goals (17 SDGs)
3. Significance of Sustainable Development
4. Environment Friendly Practices At Workplace and Home (Three Rs' of Waste Management, Water Conservation, Energy Conservation)

UNIT IV: Environmental Acts

1. The Water (Prevention and Control of Pollution) Act, 1974: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
2. The Air (Prevention and Control of Pollution) Act, 1981: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
3. The Environment (Protection) Act, 1986: Objectives, Definition of important terms used in this Act, Details about the act.
4. Environmental Impact Assessment: Concept and Benefits

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Vishwavidyalaya, Indore	Vishwavidyalaya, Indore		

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
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***Teacher Assessment** shall be based on following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT V: Role of Individuals, Corporate and Society

1. Environmental Values
2. Positive and Adverse Impact of Technological Developments on Society and Environment
3. Role of an individual/ Corporate/ Society in environmental conservation
4. Case Studies: The Bhopal Gas Tragedy, New Delhi's Air Pollution, Arsenic Pollution in Ground Water (West Bengal), Narmada Valley Project, Cauvery Water Dispute, Fukushima Daiichi Disaster (Japan), Ozone Hole over Antarctica, Ganga Pollution, Deterioration of Taj Mahal, Uttarakhand flash floods

Suggested Readings:

1. Rogers, P.P., Jalal, K.F. , Boyd, J.A.(Latest Edition) . **An Introduction to Sustainable Development.** Earthscan
2. Kalam, A.P.J. (Latest Edition) . ***Target 3 Billon: Innovative Solutions Towards Sustainable Development.*** Penguin Books
3. Kaushik , A. and Kaushik (Latest Edition). ***Perspectives in Environmental Studies***. New Delhi:
   New Age International Publishers.
4. Dhameja, S.K. (Latest Edition). ***Environmental Studies***. S.K. Kataria and Sons.New Delhi
5. Bharucha, E. (Latest Edition). ***Environmental Studies for Undergraduate Courses.*** New Delhi: University Grants Commission.
6. Wright, R. T. (Latest Edition). ***Environmental Science: towards a sustainable future*** .New Delhi: PHL Learning Private Ltd.
7. Rajagopalan, R. (Latest Edition). ***Environmental Studies***. New York: Oxford University Press.