

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**CIRCULAR NO.SU/Engg./T.Y.B.Tech./63/2018**

It is hereby informed to all concerned that, the syllabi prepared by the Board of Studies & recommended by the Dean, Faculty of Science & Technology, the **Academic Council at its meeting held on 30 June & 02 July 2018 has accepted the following syllabi in accordance with Choice Based Credits & Grading System for all Branches T.Y.B.Tech** under the Faculty of Science & Technology as enclosed herewith.

Sr.No.	Syllabi as per CBC & GS
[1]	Third Year B.Tech.[Civil Engineering],
[2]	Third Year B.Tech. [Mechanical Engineering],
[3]	Third Year B.Tech. [Agricultural Engineering],
[4]	Third Year B.Tech.[Electrical Engineering],
[5]	Third Year B.Tech. [Plastic & Polymer Engineering],
[6]	Third Year B.Tech [Electronics & Telecommunication Engg.],
[7]	Third Year B.Tech. [Computer Science Engineering].

This is effective from the Academic Year 2018-2019 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO. SU/T.Y.B.TECH./2018/

Date:- 03-07-2018. /10486-96 *****

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104/6/7/18
Deputy Registrar,
Syllabus Section.

Copy forwarded with compliments to :-

- 1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
- 2] The Director, University Network & Information Centre, UNIC, with a **request to upload this Circular on University Website.**

Copy to :-

- 1] The Director, Board of Examinations & Evaluation,
- 2] **The Section Officer,[Engineering Unit] Examination Branch,**
- 3] The Section officer, [Eligibility Unit],
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [Computer Unit-2] Examinations,**
- 6] The In-charge, [E-Suvidha Kendra],
- 7] The Public Relation Officer,
- 8] The Record Keeper,

**DR. BABASAHEB AMBEDKAR MARATHWADA
UNIVERSITY,
AURANGABAD**

[FACULTY OF SCIENCE AND TECHNOLOGY]



**REVISED SYLLABUS
Of
T. Y. B. Tech. (Mechanical Engineering)
(w.e.f. academic year 2018-19)**

FACULTY OF SCIENCE AND TECHNOLOGY
Proposed Revised Structure w.e.f.2018-2019
T.Y. B.Tech. (Mechanical)

Sub Code / Faculty Name	SEMESTER-V	Contact Hrs / Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory Exam
MED301	Design of Machine Elements I:	4	-	-	4	20	80	-	-	100	4	3 Hrs
MED302	Production Management:	4	-	-	4	20	80	-	-	100	4	3 Hrs
MED303	Heat Transfer:	4	-	-	4	20	80	-	-	100	4	3 Hrs
MED304	CAD/CAM/CAE:	4	-	-	4	20	80	-	-	100	4	3 Hrs
MED305	Theory of Machines:	4	-	-	4	20	80	-	-	100	4	4 Hrs
MED341-343	Elective II :	2	-	-	2	10	40	-	-	50	2	2 Hrs
MED321	Lab: Design of Machine Elements I:	-	-	2	2	-	-	25	25	50	1	
MED322	Lab: Heat Transfer:	-	-	2	2	-	-	25	25	50	1	
MED323	Lab: CAD/CAM/CAE:	-	-	2	2	-	-	25	25	50	1	
MED324	Lab: Theory of Machines:	-	-	2	2	-	-	50	-	50	1	
MED325	Minor Project:	-	-	2	2	-	-	50	-	50	1	
	Total of semester-V	22	-	10	32	110	440	175	75	800	27	
Sub Code / Faculty Name	SEMESTER-VI	Contact Hrs / Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory Exam
MED351	Design of Machine Elements II:	4	-	-	4	20	80	-	-	100	4	3 Hrs
MED352	Materials and Metallurgy:	4	-	-	4	20	80	-	-	100	4	3 Hrs
MED353	Internal Combustion Engines:	4	-	-	4	20	80	-	-	100	4	3 Hrs
BSH354	Industrial Management (All)	4	-	-	4	20	80	-	-	100	4	3 Hrs
*	Open Elective I	4	-	-	4	20	80	-	-	100	4	3 Hrs
MED355	Computational Techniques	2	-	-	2	10	40	-	-	50	2	2 Hrs
MED371	Lab: DME II:	-	-	2	2	-	-	25	25	50	1	
MED372	Lab: Materials and Metallurgy	-	-	2	2	-	-	25	25	50	1	
MED373	Lab: Internal Combustion Engines	-	-	2	2	-	-	25	25	50	1	
MED374	Lab: Computational Techniques	-	-	2	2	-	-	50	-	50	1	
MED375	Project I	-	-	2	2	-	-	-	50	50	1	
**	#Audit Course-I	2	-	-	2	-	-	-	-	-	-	
	Total of semester-VI	24	-	10	34	110	440	125	125	800	27	
	Grand Total of V& VI									1600	54	

L: Lecture hours per week T: Tutorial hours per week P: Practical hours per week CT: Class Test
TH: University Theory Examination TW: Term Work P: Practical/Oral Examination

Note: Interested students can opt for any one of the audit course offered by various departments.

#For Audit course, audit pass (NP) and audit fail (NF) grades will be awarded.

Elective II: -

Sr. No.	Name of course	Course code
1	Turbo Machines	MED341
2	Mechatronics	MED342
3	Reliability Engineering	MED343

Open Elective-I Course

Sr. No.	Name of course	Department	Course code
1.	Remote Sensing and GIS	AED	AED381
2.	Professional Ethics and Cyber Security	CSED	CSE381
3.	Design for Environment	CED	CED381
4.	Robotics and Automation	EED	EED381
5.	Internet of Things	ETC	ETC381
6.	Costing and Financial Management	MED	MED381
7.	Introduction to Nano Technology	PPED	PPE381

Sr. No.	Name of course	Department	Course code
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Audit-ICourses

1.	Japanese Language Module	BSH	BSH801
2.	Cyber Crime and Law	CSED	CSE801
3.	Road Safety Management	CED	CED801
4.	Value Education	BSH	BSH802
5.	Smart Cities	ETC	ETC801
6.	Rural community Engagement	MED	MED801
7.	German Language Module	BSH	BSH803

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED301 Course: Design of Machine Elements-I Teaching Scheme: 04 hrs/week Class Test: 20 marks Theory: 04hrs/week Theory Examination (Duration): 03 hrs Credits: 04 Theory Examination (Marks): 80	
Objectives	: 1. Understand the meaning of machine design and design process. 2. Predict effectively and accurately the reasons of failure and then correlate it to the theoretical knowledge. 3. Developing the capability of analyze and select the various criteria of design. 4. Developing the creativity for designing the various components such as shaft, keys, pins, levers, couplings, cotter joint & knuckle joint etc. 5. Developing the creativity for designing the various types of fasteners including riveted joints and welded joints at various loading conditions
Unit-I	: Fundamentals of Design of Machine Elements: A] Design Classification, Phases of Design, Design considerations, Selection of Materials & BIS designations of materials B] Design of shaft, keys, combined stresses, C clamp & frames, Application of theories of failure. 10 hrs
Unit-II	: Design against static loading: A] Design of Cotter Joint, Knuckle joint and lever. B] Design of rigid and flexible couplings. 07 hrs
Unit-III	: Design of Screw & Fasteners: Design of bolted and threaded joints, power screws and introduction to re-circulating ball screw. 07 hrs

Unit-IV	:	Design against Fluctuating load: A] Stress concentration, fatigue failure, S-N diagram, endurance limit, notch sensitivity.B] Goodman diagram, Soderberg diagram, Gerber diagram and Modified Goodman diagram, Fatigue design under combined stress. 10 hrs		
Unit-V	:	Design of Spring: Introduction of Springs, Design of helical spring, Design of leaf spring. 07 hrs		
Unit-VI	:	Design of Riveted & Welded Joints: A] Rivet Joint: Types, failure of rivet joint, design of rivet joint including eccentrically loaded joint.B] Welded Joint: Types, failure, Design of Welded joint including bending and eccentric loading. 07 hrs		
Reference Books, e-books, e-Journals	Sr. No.	Title	Author	Publication
	1	Design of Machine Elements	J. E. Shigley	TMH Publication
	2	Design of Machine Elements	M. F. Spotts	Prentice Hall
	3	Machine Design	V. B. Bhandari	TMH Publication
	4	Machine Design	Khurmi & Gupta	Eurasia Publishing House
	5	Machine Design	U. C. Jindal	Pearson Publication

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Mechanical)

Course Code: MED302

Course: Production Management

Teaching Scheme: 04 Hrs/week

Class Test: 20 marks

Theory: 04 Hrs/week

Theory Examination (Duration): 03 Hrs

Credits: 04

Theory Examination (Marks): 80

Objectives	:	<ol style="list-style-type: none">1. To equip the students with a strong foundation in logical thinking and through knowledge in the production management2. To have through understanding about the use of different numerical techniques and apply them in practical engineering applications.
Unit-I	:	Introduction:- Concept of production, Types of production, Levels of production planning, Functions of PPC. Product development and design:- Product life cycle, Company policy, Effect of competition on design, Product analysis: marketing, functional, operational aspects, durability and dependability, aesthetic aspect, economic analysis, profit considerations, simplification, standardization, specialization, diversification 08 Hrs
Unit-II	:	Plant layout :- Site selection, Plant layout: Types of layout, principles of good layout, Tools and techniques of plant layout, effect of automation on layout Sales Forecasting :- Introduction, need for demand forecasting, numerical on demand forecasting 08 Hrs
Unit-III	:	Productivity- Definition, Importance and measurement of productivity, Factor productivity indices Capacity Planning- Concept, Measurement and measures of

		capacity, Factors affecting, capacity planning procedure, over and under capacity, aggregate planning 08 Hrs		
Unit-IV	:	Materials management -Concept, objectives, scientific purchasing, purchasing methods, vendor selection and rating, Inventory: Types, cost relationship, inventory models, ABC analysis, Need for reduction of material handling, Concept of unit load Materials Handling -Need for reduction in material handling, Equipments for material handling, Material handling survey check sheet, Principle of unit load, palletization and containerization. 08 Hrs		
Unit-V	:	Human resources management -Training and recruitment, motivation, job evaluation and merit rating Maintenance Management -Objectives and Functions of maintenance management, Types of maintenance, TPM. 08 Hrs		
Unit-VI	:	Work Study -Introduction, Method study : Definition, procedure and recording techniques Work measurement : Definition, objectives, techniques, procedure, computation of standard time, PMTS, MOST. 08 Hrs		
Reference Books, e- books, e- Journals	Sr. No.	Title	Author	Publication
	1	Elements of production planning and control	Samuel Eilon	Macmillan
	2	Modern production/operation management	S.Buffa	John Willey and sons
	3	Industrial Engineering and Management	O.P.Khanna	Dhanpat Rai
	4	Cost and optimization engineering	F.C.Jelen	McGraw Hill
	5	Introduction to work study	I.L.O.	I.L.O.

Section A: - Unit I, II and II and Section B: - Unit IV, V and VI

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section

3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED303 Course: Heat Transfer Teaching Scheme: 04 Hrs/week Class Test: 20 marks Theory: 04 Hrs/week Theory Examination (Duration): 03 Hrs Credits: 04 Theory Examination (Marks): 80	
Objectives	: 1. To study the fundamental principles and laws of heat transfer and to explore the implications of these principles for system behaviour. 2. To study, analyze and design heat transfer systems through the application of these principles. 3. To develop the problem-solving skills essential to good engineering practice of heat transfer in real-world applications.
Unit-I	: Introduction: Modes and laws of heat transfer, Mechanism of modes of heat transfer, Thermo-physical properties and their significance, Electrical Analogy, Derivation of generalized heat conduction equation in Cartesian, cylindrical and spherical co-ordinates with simplification of the same. 06 Hrs
Unit-II	: Steady state and Unsteady state heat conduction: One dimensional steady state heat conduction:- Heat conduction through a plane wall, cylindrical wall and sphere, Heat conduction through a composite slab, cylinder and sphere, Effect of variable thermal conductivity, Critical radius of insulation, economic insulation, and thermal contact resistance, One dimensional steady state heat conduction with heat generation for plane wall, cylinder and sphere. Unsteady state heat conduction:- Development of unsteady state heat transfer equation for objects /system with negligible internal resistance, Biot and Fourier numbers, Lumped heat capacity method, Use of Heisler charts. 12 Hrs
Unit-III	: Extended Surfaces (Fins): Need Types and Applications of Fins, Theory of simple pin-

		<p>fin under steady state conduction without heat generation with different end conditions, Derivation of temperature distribution equations and heat transfer through fins of constant cross-sectional area, Effectiveness and efficiency of a fin, Application of fin theory for error estimation in temperature measurement.</p> <p style="text-align: right;">06 Hrs</p>		
Unit-IV	:	<p>Convection heat transfer: Introduction:-Local and average convective coefficient, Hydrodynamic and thermal boundary layer, Laminar and turbulent flow over a flat plate and through a duct, Friction factor, Drag and drag co-efficient. Free and Forced Convection:-Different dimensionless numbers and physical significance of these dimensionless numbers related to free and forced convection, Empirical correlations for free and forced convection for heat transfer in laminar and turbulent flow over a flat plate and through a duct, Condensation heat transfer, Nusselt theory, film wise and drop wise condensation, heat transfer in pool boiling phenomenon.</p> <p style="text-align: right;">08 Hrs</p>		
Unit-V	:	<p>Radiation :Fundamental concepts and definitions, Black body radiation, Planck's distribution law, Wien's displacement law, Stefan-Boltzmann law, Kirchhoff's law, Lambert's cosine law. Surface emission, radiative properties of a surface, grey, black and real surface, Radiation shape factor, use of shape factor charts, Heat exchange between non-black bodies, heat exchange between two infinitely parallel planes and cylinders, Radiation shields, heat exchange by radiation between two finite black/gray surfaces, Irradiation, radiation potential, electrical network method of solving radiation problems.</p> <p style="text-align: right;">08 Hrs</p>		
Unit-VI	:	<p>Heat Exchangers: Heat exchangers classification, Overall heat transfer coefficient, Heat exchanger analysis, use of log mean temperature difference (LMTD) for parallel and counter flow heat exchangers, LMTD correction factor, fouling factor, The effectiveness-NTU method for parallel and counter flow heat exchangers. Design considerations of heat exchanger, compact heat exchangers.</p> <p style="text-align: right;">08 Hrs</p>		
Reference Books, e- books, e- Journals	Sr. No.	Title	Author	Publication
	1	A Text Book of Heat Transfer	S. P Sukhatme	University Press, Edition
	2	Heat & Mass Transfer	Yunis A. Cengel&A. J. Gajar	Tata McGrawHill,
	3	Heat & Mass Transfer	R. K. Rajput	S. Chand Publication

	4	Heat Transfer	J. P. Holman	Tata McGraw Hill
	5	Fundamentals of Engineering Heat & Mass Transfer,	R.C. Sachdeva	Wiley Eastern Ltd. (I)
	6	Heat & Mass Transfer	D.S.Kumar	Katson Books
	7	Fundamentals of Heat & Mass Transfer	Incropera and Dewitt	John Wiley and Sons

Section A: - Unit I ,II and II and Section B: - Unit IV, V and VI

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Mechanical)

Course Code: MED304		Course: CAD/CAM/CAE
Teaching Scheme: 04 Hrs/week		Class Test: 20 marks
Theory: 04 Hrs/week		Theory Examination (Duration): 03 Hrs
Credits: 04		Theory Examination (Marks): 80
Objectives	:	<ol style="list-style-type: none">1. To understand concepts of CAD/CAM/CAE and its applications.2. To study different modelling tech. and transformations in CAD.3. To learn analysis of components using basic FEA techniques.4. To learn CNC part programming and latest trends in CAD/CAM/CAE.5. To study GT, 3D printing and recent trends in CAD/CAM/CAE.
Unit-I	:	Introduction: Introduction, What is CAD, CAM, CAE?, Product cycle and role CAD/CAM/CAE, Applications of CAD/CAM/CAE, Software configuration of graphics system, Introduction to various CAD/CAM/CAE technologies like CFD, CIM, ERP, PLM. 08 Hrs
Unit-II	:	Geometric modelling and transformations: Geometric modelling techniques: Wireframe, Surface and Solid modelling, CSG and Boolean operations, B-rep and Sweep re-presentation, 2D & 3D Geometric transformations - Translation, rotation, scaling, mirror, shearing, Concatenation of matrices, Applications of geometric transformations. 08 Hrs
Unit-III	:	Finite Element Analysis: Concept of stress strain curve, Types of analysis, Steps in FEA Pre-processing, Solution, Post-processing, Discretization and types of elements (1D, 2D, 3D), Free and Mapped meshing, one example of basic element analysis (1D or 2D). 08 Hrs
Unit-IV	:	NC/CNC Machine tools and Robotics: NC/CNC Machine tool components, Coordinate systems, Fixed and floating zero concept, Concept of CNC and DNC machine tools, Manual part programming (G-codes, M-codes), Physical configuration of Robot, types of robots, Robot programming methods. 08 Hrs
Unit-V	:	Group technology and Flexible manufacturing systems: Group technology, Parts classification & coding system, Application of group technology, Types of Automation-

		Fixed, Flexible and Programmable, Flexible manufacturing system, Components of FMS, Types of FMS, and Introduction to CIMS. 08 Hrs		
Unit-VI	:	3D Printing and Recent trends in CAD/CAM: 3D printing general principle, 3D printing technologies - SLA, FDM, SLS, SLM, EBM, DLP, 3D printing applications, Design and management of distributed supply chains, vendor management inventory, Role of internet in creating real-time traceability with RFID, UID etc., Collaborative planning forecasting and replenishment. 08 Hrs		
Reference Books, e-books, e-Journals	Sr. No.	Title	Author	Publication
	1	CAD/CAM	M.P.Groover and E. W. Zimmer	Prentice hall of India.
	2	CAD/CAM Principles & Applications	P. N. Rao	McGraw Hill.
	3	CAD/CAM	Zeidibraham R. Sivasubramanian	Tata McGraw Hill.
	4	CAD/CAM/CIM	P. Radhakrishnan S. Subramanian V. Raju	New Edge publications

Section A: - Unit I ,II and II and Section B: - Unit IV, V and VI

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Science & Technology)
Syllabus of T. Y. B. Tech. (Mechanical)

Course Code: MED305	Course: Theory of Machines
Teaching Scheme: 04 Hrs/week	Class Test: 20 marks
Theory: 04 Hrs/week	Theory Examination (Duration): 04Hrs
Credits: 04	Theory Examination (Marks): 80

Objectives	<ol style="list-style-type: none"> 1. To understand classification and types of mechanisms. 2. To understand kinematics and dynamics of various machines. 3. To understand functions and types of various machine elements. 4. To understand balancing of various unbalanced forces in machines.
Unit: I	<p>Mechanisms and Inversions: Rigid body, Mechanism and Machine, Kinematic Link, Kinematic Pair and their Classification, Degrees of Freedom, Kinematic Chain, Linkage, Mechanism and Structure, Gruebler's Criterion for degrees of freedom, Inversions of Four Bar mechanism, Slider-Crank mechanism, Kinematic inversions, Double slider-crank mechanism.</p> <p style="text-align: right;">04Hrs</p>
Unit: II	<p>Velocity Analysis: Velocity analysis of mechanisms (having maximum six links) using relative velocity method and Instantaneous centre method, Kennedy's theorem, Determination of linear and angular velocities and their directions.</p> <p style="text-align: right;">08Hrs</p>
Unit: III	<p>Acceleration analysis: Acceleration analysis of mechanisms. Problems involving Corioli's component of acceleration. Determination of linear and angular component of acceleration using graphical and analytical method .Klein's construction and Ritterhaus construction method for simple engine mechanisms.</p> <p style="text-align: right;">12 Hrs</p>
Unit: IV	<p>Classification of cams and followers: Types of cams and followers, Terminology and definitions. Displacement diagrams of follower with Uniform velocity, simple harmonic motion, uniform acceleration and retardation and cycloidal motions. Construction of cam profile using these motions. Determination of velocity and acceleration.</p> <p style="text-align: right;">06 Hrs</p>
Unit: V	<p>Flywheel, Governors, Brakes and Dynamometer: Turning moment diagram, fluctuation of energy in flywheel. Principle, working and types of governor like Watts, Porter, Proell and Hartnell governor. Functions and types of Brakes .Types of dynamometers. Absorption type dynamometers like Prony brake rope brake and transmission type dynamometer like belt transmission, epicyclic gear train and torsion dynamometer.</p> <p style="text-align: right;">10 Hrs</p>
Unit: VI	<p>Balancing: Balancing of rotating masses acting in one or more planes. Static and dynamic</p>

	balancing. Balancing of reciprocating engines. Primary and secondary forces and couples acting on single cylinder and double cylinder engines. Balancing of in line, radial, V-engine, V-8 and W-12 engines. 08 Hrs			
Reference Books, e- books, e- Journals	Sl.No.	Title	Author	Publication
	1	Theory of Machines	S. S. Ratan	Tata McGraw Hill Education.
	2	Theory of Machines	T. Beven	Pearson Education India
	3	Theory of Machines	Balaney	Khanna Publications.
	4	Theory of Machines	Joseph E Shigley	John Uicker McGraw Hill
	5	Text book of Theory of Machines	R.K.Bansal	Laxmi publications

Section A: - Unit I ,II and II and Section B: - Unit IV, V and VI

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Mechanical)

Course Code: MED341

Course: EI-II (Turbo machines)

Teaching Scheme:

Class Test: 10 marks

Theory: 02 Hrs/week

Theory Examination (Duration): 02 Hrs

Credits: 02

Theory Examination (Marks): 40

Objectives	:	1. To study the fundamental principles of impact of jet and fluid power and to explore the implications of these principles for various system behavior. 2. To study, analyze and design components of turbo machinery through the application of these principles. 3. To develop the problem-solving skills essential to address real-world applications.
Unit-I	:	Impact of Jet: Introduction, Force exerted by jet on stationary vertical, inclined & curved plate, Force exerted by jet on moving plates :-flat vertical , inclined & curved plate. 04 Hrs
Unit-II	:	Hydraulic Turbines: Introduction, Classification, Impulse Turbine, Construction & working of pelton wheel, Work done & efficiency of a pelton wheel, Definition of heads & efficiency, design aspects of pelton wheel, Radial flow Reaction Turbine, Construction & working of Francis turbine, Design of a Francis turbine runner, Axial flow reaction turbine, Propeller Turbine, Kaplan Turbine, Runway speed, Draft Tube, Draft tube Theory, Types of draft tubes, Specific Speed, Unit Quantities, Performance Characteristics of Hydraulic Turbines, Cavitations. 04Hrs
Unit-III	:	Centrifugal Pumps: Introduction, Construction & Working of Centrifugal Pumps (C.P.) Work done by the impeller on water, Definition of Heads & efficiencies of C. P. Losses in C. P. Minimum Speed for Starting a C.P., Effect of variation of Discharge on efficiency, Effect of no. of vanes of impeller on head & efficiency, Single and Multistage C.P., Pumps in Series, Pumps in Parallel, NPSH, Cavitations and Priming. 04 Hrs
Unit-IV	:	Steam Turbines: Introduction, classification, advantages of turbines, Impulse & reaction turbines, Velocity diagrams, work done on turbine blades, turbine efficiency, and losses in steam turbines 04 Hrs
Unit-V	:	Gas Turbines: Simple cycle, Brayton cycle, Performance evaluation parameters like force, work done, efficiency, air fuel ratio, regeneration, reheating, inter-cooling, Ericsson cycle and Sterling Cycle 04 Hrs

Unit-VI	:	Axial and Centrifugal Flow Compressor: Axial Flow Compressor:-Introduction. Geometry and working principle, Stage losses and efficiency, Work done factor, Performance characteristics. Centrifugal Flow Compressor:-Introduction and different parts of centrifugal compressor, Principles of operation. H-S diagram, Performance characteristics and losses in centrifugal compressor. 04 Hrs		
Reference Books, e- books, e- Journals	Sr. No.	Title	Author	Publication
	1	Steam and Gas Turbine	R.S.Yadav	Central Publication,Allahabad
	2	Fluid Mechanics & Hydraulic Machines	R.K.Bansal	Laxmi Publication
	3	Fluid Mechanics & Fluid power Engineering	D.S.Kumar	S.K. Kataria& Sons Delhi
	4	Fluid Mechanics & Hydraulic Machines	R.K.Rajput	S.Chand Publication
	5	Gas Turbines	V.Ganeshan	McGraw Hill Publication
	6	Gas Turbines Theory	Cohen Rogers	Longman Publications
	7	Handbook of pumps	Karrasik	TMH Publication
8	Compressors Turbines and Fans	S.M.Yahya,	Tata McGraw Hill Publication	

Section A: - Unit I ,II and II and Section B: - Unit IV, V and VI

Pattern of Question paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 Marks Paper:

1. Minimum eight questions.
2. Four questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 5 should be of objectives nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Mechanical)

Course Code: MED342		Course: EI-II (Mechatronics)
Teaching Scheme:		Class Test: 10 marks
Theory: 02 Hrs/week		Theory Examination (Duration): 02 Hrs
Credits: 02		Theory Examination (Marks): 40
Objectives	:	<ol style="list-style-type: none">1. To study need of Mechatronics2. To study Mechatronics system components3. To study interfacing of various components in Mechatronics system4. To study various Mechatronics sub-systems5. To understand interfacing concepts, Electro Mechanical Systems and the related terms
Unit-I	:	Introduction and Mechatronics system model: Introduction to Mechatronics system, Role of each component in working of the system. Element of Mechatronics system-mechanical system (sensor/actuators) signal conditioning (amplifier- filters), Need of signal conditioning ,Graphical Display (LED,LCD), data acquisition, micro controllers, VirtualInstrumentation, Digital filters. 04 Hrs
Unit-II	:	Sensors and Signal Conditioning: Definition and Classification, Principle, construction and working of Linear displacement and rotational Displacement sensors, Acceleration sensors, Force measurement, Temperature measurement, proximity sensors, Vision sensor, , Instrumentation amplifiers, OP-AMP (S/I/D/A) 04 Hrs
Unit-III	:	Data Acquisition: Analog to digital conversion, resolution and quantization, A to D conversion, D to A conversion, Introduction to micro controllers and microprocessors use of micro controllers and microprocessors in Mechatronics, micro controller 8051 architecture, pin configuration, Design of real time Data Acquisition system. 04 Hrs
Unit-IV	:	Actuators & Display devices: Electro-mechanical Actuators, Electrical Machines (Stepper & servo motors), Piezoelectric actuators, Hydraulic & Pneumatic actuation system, MEMS actuators. 04 Hrs
Unit-V	:	Programmable Logic Controller(PLC): Introduction-Basic structure, Input/output Processing-Programming, Ladder Diagrams, Mnemonics-Timers, Internal relays and counters, Data handling, Analog Input/output 04 Hrs

Unit-VI	:	Mechatronics System Design: Case study (Robotics/Nanotechnology/Automobiles): Definition of problem, Design of Mechatronics system, Selection of sensor, Selection of actuator, Selection of a PLC, Selection of digital processor and signal conditioning systems. 04Hrs		
Reference Books, e- books, e- Journals	Sr. No.	Title	Author	Publication
	1	Introduction to mechatronics & measurement system.	David G.Alicator Michal B.Histand	McGraw Hill
	2	Mechatronics	HMT	TMH
	3	Process Control Instrumentation Technology.	Curtis Johnson	PHI
	4	Automatic Control system	Hassan Saeed	New India Publication.
	5	Computer Based Industrial Control.	Krishna Kant	TMH

Section A: - Unit I ,II and II and Section B: - Unit IV, V and VI

Pattern of Question paper:

The 6 units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 Marks Paper:

1. Minimum eight questions.
2. Four questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 5 should be of objectives nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

		minimum effort method, redundant systems. Reliability prediction based on exponential distribution, fault tree and success tree methods, events tree method, failure model, failure mechanism.		
		04 Hrs		
Unit-VI	:	Reliability Testing: product testing, reliability life Testing, Burn- In testing, and accelerated life testing, Censored and uncensored field data, acceptance testing,		
		04 Hrs		
Reference Books, e- books, e- Journals	Sr. No.	Title	Author	Publication
	1	An Introduction to Reliability and Maintainability Engineering	Charles E. Ebeling,	TMH Publication, New Delhi.
	2	Concept in Reliability in Engineering	L.S. Srinath,	Affiliated East West Press
	3	Reliability in Engineering Design	K.C.Kapur and L.R.Lumbersome	John Willey and sons.
	4	Reliability Evaluation of Engineering Systems	Roy Billinton and Ronald N Allan	Springer
	5	Reliability Base Design	S S Rao	Tata McGraw Hill Publication
	6	Reliability Engineering Theory and Practice	Alessandro Birolini	Springer
	7	Reliability Analysis for Engineers by	Roger D Leitch	Oxford University Press.
Additional References:	:	<ol style="list-style-type: none"> 1. nptel.iitm.ac.in 2. ocw.mit.edu 3. see.stanford.edu 4. Reliability Engineering and System safety (Elsevier) 5. International Journal of reliability, Quality and Safety Engineering (World Scientific Publishing Company) 6. International Journal of Performability Engineering (RAMS Consultant) 7. Quality and Reliability Engineering International (Wiley Online Library) 8. Reliability Engineering (Elsevier) 9. Journal of Quality in Maintenance Engineering (Emerald) 		

Section: A Units I, II and III; Section: B Units IV, V, and VI

Pattern of Question paper:

The 6 units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 Marks Paper:

1. Minimum eight questions.
2. Four questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 5 should be of objectives nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED321 Course: Laboratory of Design of Machine Elements-I Teaching Scheme: Teachers Assessment: 25 marks Practical: 02 Hrs/week Practical : 25 marks Credits: 01	
Objectives	: 1. After successful completion of course, students shall be able to design mechanical joints and its components.
List of Practical's (Not Less than 10)	: A. Two full imperial sheets on following: 1. Design and drawing sheet on any one of the following: Cotter joint, Knuckle joint, lever loaded safety valve or spring loaded safety valve 2. Design and drawing sheet on any one of the following: Rigid or flexible coupling, bolted or welded joints, including bending and eccentric loading, Power screw or screw jack, C-clamp B. Assignments on following topics: Design of Screw & Fasteners, Design against static loading, Fundamentals of design of machine Elements, Design against Fluctuating load, Design of Spring, Design of Riveted & Welded Joints C. Case Study-I Case study on the design of mechanical joint involving multiple machine components: It should expose the students to some aspects of joint design such as selection and configuration of the mechanical joint.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED322 Teaching Scheme: Practical: 02 Hrs/week Credits: 01	Course: Laboratory of Heat Transfer Teachers Assessment: 25 marks Practical : 25 marks
Objectives	: 1. The laboratory course is aimed to provide the practical exposure to the students with regard to the determination of amount of heat transferred/exchanged in various modes of heat transfer including thermal conductivity of different materials and determination of different constants in heat transfer.
List of Practical's (Not Less than 10)	: <ol style="list-style-type: none"> 1 Determination of Thermal conductivity of metal rod 2 Determination of Thermal conductivity of Composite Wall 3 Determination of Thermal conductivity of Insulating Powder 4 Determination of the local heat transfer coefficient of air for a vertical tube losing heat by natural convection. 5 Determination of average heat transfer coefficient in forced convection of air in a tube 6 Determination of heat transfer, fin efficiency and temperature distribution along the length of pin-fin in natural and forced convection 7 Experimental verification of Steffen Boltzmann's constant 8 Determination of emissivity of the test plate surface 9 Determination of LMTD, the heat transfer rate, overall heat transfer coefficient and effectiveness of a parallel flow heat exchanger. 10 Determination of LMTD, the heat transfer rate, overall heat transfer coefficient and effectiveness of a counter flow heat exchanger. 11 Assignments on Unit I,II,III,IV,V,VI (Any Three)

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED323 Teaching Scheme: Practical: 02 Hrs/week Credits: 01	Course: Laboratory of CAD/CAM/CAE Teachers Assessment: 25 marks Practical : 25 marks
Objectives	: <ol style="list-style-type: none"> 1. Introduction to CAD/CAM/CAE software's through 2D, 3D part modelling and FEA analysis. 2. Introduction to CNC part programming. 3. Introduction to recent trends in CAD/CAM/CAE.
List of Practical's	: <ol style="list-style-type: none"> 1. 2D Part modelling practice. 2. 3D Part modelling practice. 3. Component details and assembly in CAD. 4. Analysis of simple 2D/3D component using any analysis software. 5. Part programming on CNC lathe machines. 6. Part programming on CNC milling machines. 7. Case study on 3D printing, FMS, Supply chain management etc. 8. Report on industrial visit.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED324 Course: Laboratory of Theory of Machines Teaching Scheme: Teachers Assessment: 50 marks Practical: 02 Hrs/week Practical :NA Credits: 01	
Objectives	: 1. To understand classification and types of mechanisms. 2. To understand kinematics and dynamics of various machines. 3. To understand functions and types of various machine elements. 4. To understand balancing of various unbalanced forces in machines.
List of Practical's (Not Less than 10)	: 1. Study of kinematics, pairs, various simple mechanisms and their inversions. 2. Solution of two problems on velocity analysis by instantaneous center method. 3. Solution of two problems on velocity analysis by relative velocity method. 4. Solution of two problems on acceleration analysis by relative velocity method. 5. Study of various types of brakes and dynamometers. 6. Solution of two problems on balancing. 7. Study of gyroscopic effect and finding moment of inertia of gyroscopic disc. 8. Determine radius of gyration of a given bar using bifilar and trifilar suspension. 9. Plotting controlling force diagram for porter and Hartnell governor. 10. Solution of two problems on Cams. 11. Study of Whirling of Shaft 12. Study of Static and dynamic balancing machine

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (All Branches)

Code No.:MED325

Title: Minor Project

Teaching Scheme: 02 Hrs/week

Teachers Assessment(Marks): 50

Practical: 02 Hrs/week

Credits:01

Objectives	:	<ol style="list-style-type: none">1. To plan for various activities of the project and distribute the work amongst team members.2. To develop the ability to define and design the problem and lead to its accomplishment with proper planning.3. To understand the importance of document design by compiling Technical Report on the Minor Project work carried out.4. To develop student's abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Minor Project.
Guidelines	:	<ol style="list-style-type: none">1. Students should select a problem which addresses some basic home, office or other real life applications.2. Projects which will address the social issues will be given due weightage.3. It is desirable that the systems developed by the students have some novel features.4. The batch size shall not exceed TWO students per batch.5. The students have to select a suitable problem, design, prepare the drawings, produce the components, assemble and commission the project.6. Institute may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester.7. At the end of the semester, the students have to prepare and present 20-25 pages project report.8. Final evaluation shall be based on continuous internal assessment followed by Viva-Voce.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Mechanical)

Course Code: MED351

Course: Design of Machine Elements-II

Teaching Scheme: 04 Hrs/week

Class Test: 20 marks

Theory: 04 Hrs/week

Theory Examination (Duration): 03 Hrs

Credits: 04

Theory Examination (Marks): 80

Objectives	:	<ol style="list-style-type: none">1. Understand the procedure of gear design and gear trains.2. Predict effectively and accurately the reasons of failure and then correlate it to the theoretical knowledge.3. Developing the capability of analyze and select the various criteria of design.4. Developing the creativity for designing the mechanical power transmission drive and its components.5. Understand the basic concepts of finite element method, boundary element method, virtual prototyping, optimization methods
Unit-I	:	Design of Gear Drive: Design considerations of gears, material selections, types of gear tooth failure. A] Design of Spur gears, Helical gears, Worm gears & bevel gears B] Introduction to Gear trains and types of gear trains. 12 Hrs
Unit-II	:	Design of Friction Clutch: Introduction of friction clutch, design of single plate clutch, multi-plate clutch, cone clutch and centrifugal clutch. 06Hrs
Unit-III	:	Design of Belt Drives: Introduction, types, materials of belt drives. A] Flat belt: Design of Open flat belt and Crossed flat belt. B] V-belt: Design of V-belt using standard catalogue. 06 Hrs
Unit-IV	:	Design of Wire rope & Chain Drive: Introduction, types and material selection A] Design of wire rope. B] Design of simple chain drive. 07 Hrs
Unit-V	:	Design of Bearings: Introduction of bearings, Types of bearings A] Sliding Contact Bearing: Design of hydrodynamic & hydrostatic bearings. B] Rolling Contact Bearing: static and dynamic load capacities, bearing life, design for variable load and speed. 12 Hrs
Unit-VI	:	Advanced Techniques in Machine Design: Introduction to Finite Element Method, Boundary Element Method, Virtual prototyping, Optimization methods. 05 Hrs

Reference Books, e- books, e- Journals	Sr. No.	Title	Author	Publication
	1	Design of Machine Elements	J. E. Shigley	TMH Publication
	2	Design of Machine Elements	M. F. Spotts	Prentice Hall
	3	Machine Design	V. B. Bhandari	TMH Publication
	4	Machine Design	Khurmi& Gupta	Eurasia Publishing House
	5	Machine Design	U. C. Jindal	PearsonPublication

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Mechanical)

Course Code: MED352		Course: Materials and Metallurgy
Teaching Scheme: 04 Hrs/week		Class Test: 20 marks
Theory: 04 Hrs/week		Theory Examination (Duration): 03 Hrs
Credits: 04		Theory Examination (Marks): 80
Objectives	:	<ol style="list-style-type: none">1. Introduce students to the field of materials science and materials testing.2. To understand various types of phase diagrams their applications.3. To understand principle of various Heat Treatments.4. To understand classification of Alloy Steels and cast iron.5. To introduce latest materials in manufacturing.
Unit-I	:	Mechanical properties and Crystallography: Overview of material classification, Principle and measurement of Mechanical Engineering properties like hardness, Tensile strength, Impact strength, Creep, Toughness, Resilience, Ductility, Fatigue and Wear. Relevance of properties in selection of materials for Engineering applications. System of crystal lattices, Space lattice, Unit cell, Coordination number, packing efficiency, Crystal Imperfections: Line defect, Point defect and Surface defect, Crystallographic planes and directions. <p style="text-align: right;">06 Hrs</p>
Unit-II	:	Phase Diagrams: Phases in metals, solid solutions, Hume Rothery rules. Solidification of pure metals and an alloys, cooling curves, phase rule, Allotropy, Construction and interpretation of binary phase diagram, Lever rule, Types of equilibrium diagrams in metals and alloys, Iron- Carbon equilibrium diagram, Phases in Fe-C diagram, Invariant reactions, and Critical temperatures. Microstructures of Plain carbon steels, structure properties co-relationship of Plain carbon steels, Non-equilibrium cooling of steels. <p style="text-align: right;">09 Hrs</p>
Unit-III	:	Heat Treatment of steels: Transformation products of Austenite and their characteristics, Time Temperature Transformation diagrams, Continuous cooling transformation diagrams, Critical cooling rate, Heat Treatment of steels, cooling media, Annealing, Normalizing, Hardening, Tempering, Retained austenite and its effect, Cryogenic treatment, Hardenability and its measurement, Austempering, Martempering, Patenting and Ausforming of steels. Case hardening, Carburizing, Nitriding, Carbonitriding, Flame and Induction hardening of steels. Defects in heat treatment and their remedies. <p style="text-align: right;">09 Hrs</p>

Unit-IV	:	Cast irons and Alloy Steels: Types of Cast irons: White, Grey, Malleable and Nodular etc., Properties and application of cast irons, Effect of alloying elements on structure of steels and on the critical temperatures, Effect of common alloying elements on plain carbon steels, Properties and uses of Silicon and Hadfield Manganese steels, High speed steels and Stainless steel. 10 Hrs		
Unit-V	:	Non-ferrous metals and alloys: Properties and uses of important non-ferrous metals like Copper, Aluminum, Lead, Tin, and Zinc. Study of important non-ferrous alloys: Brass & Bronzes, Bearing alloys, Aluminum alloys. 07 Hrs		
Unit-VI	:	Smart Materials and Composites:- Types of smart materials and their properties. Shape memory alloys, Super alloys, and Zirconium alloys.Composites:- Smart composites, Metal matrix composites, carbon nano-tube composites. 07 Hrs		
Reference Books:	Sl.No	Title	Author	Publication
	1	Introduction to Physical Metallurgy	Sydney H Avner	Tata McGraw – Hill (Second edition)
	2	Introduction to Engineering Metallurgy	B.K.Arawal	Tata McGraw-Hill
	3	Engineering Metallurgy	R. Higgins	Tata McGraw-Hill
	4	Fundamentals of Material Science and Engineering: An Integrated approach –	William D.Callister Jr., David G.Rethwisch	John Wiley and Sons Inc.(Sixth edition)
	5	Material science and Metallurgy	V.D.Kodgire	Everest Publishing House
Additional Reference Books:	1. ASTM Handbooks			

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Mechanical)

Course Code: MED353		Course: Internal Combustion Engines
Teaching Scheme: 04 Hrs/week		Class Test: 20 marks
Theory: 04 Hrs/week		Theory Examination (Duration): 03 Hrs
Credits: 04		Theory Examination (Marks): 80
Objectives	:	1. Students are expected to understand & analyze the fundamentals and working of Internal Combustion Engines to meet the requirements.
Unit-I	:	Introduction to I C Engine: Review of IC Engine terminologies, actual valve timing diagram, various losses in actual working, dissociation, specific heats, Selection of Engine. Carburetion & Fuel Injection: Introduction, Properties of Air- fuel mixture, Air fuel mixture requirements for steady state and transient conditions. Simple carburetor, complete carburetor. Theory of simple carburetor (approximate & exact analysis), Design of Carburetor. Ideal requirements of carburetor. Air craft carburetor. Introduction to petrol injection system. Requirements of injection system, types of injection system. Bosch fuel pump, Fuel injectors, types of nozzle, Electronic fuel injection system. 10 Hrs
Unit-II	:	Combustion and Ignition in S.I. & C.I. Engines: Introduction, Combustion in S.I. Engines, Ignition limits, stages of combustion, effect of engine variables on ignition lag & flame propagation, normal & abnormal combustion, effect of detonation & its control combustion chamber design. Principle Octane rating, HUCR, Combustion in C.I. Engines: Stages of combustion, delay period, diesel knock & its control, cetane rating, Air-fuel ratio, Design of combustion chamber. 08Hrs
Unit-III	:	Ignition in S.I. & C.I. Engines: Ignition System: Ignition System Requirements, Battery & Magneto Ignition Systems, Comparison & Problems. Electronic Ignition system, Spark Advance 1 & Retard System. Exhaust emissions coming out of I.C. engine exhaust, effect on human health. Causes of formation. Pollutants measurements & abatement. Engine Lubrication and Cooling: Lubrication of engine components, Lubrication system – wet sump and dry sump, crankcase ventilation, Types of cooling systems – liquid and air cooled, comparison of liquid and air cooled systems. 06Hrs

Unit-IV	:	Measurement, Testing and Performance: Introduction, Performance parameter and their measurement- Morse Test, BP, FP., Heat balance sheet, performance characteristics of S.I. & C.I. Engines, Performance maps ,numerical. 10 Hrs		
Unit-V	:	Supercharging: Introduction, Objectives & principles of supercharging, Methods of Supercharging, Supercharging Limits, Modifications for supercharging, Advantages & limitations, Turbo charging. Recent Trends in I. C. Engines: Direct Injection systems: MPFi, CRDi; Variable valve timing systems: VTEC Engine, Valvetronic system, Alternative Fuel Engines. 08 Hrs		
Unit-VI	:	Engine Emission and their control: Air pollution due to IC engine, Euro I to VI norms, HC ,CO, NOx and other particulate emissions, and their effect on environment. Exhaust gas treatment: Catalytic converter, Exhaust Gas Recirculation. 06Hrs		
Reference Books:	Sl.No	Title	Author	Publication
	1	Internal Combustion Engines & Air pollution,	Edward Obert	Harper & Row Publications
	2	Introduction to Internal Combustion Engines	Richard Stone	SAE International.
	3	Internal Combustion Engines Fundamentals	John B Heywood	McGraw-Hill,Inc.
	4	Internal Combustion Engines	Mathur& Sharma	Dhanpat Rai & Co
	5	Internal Combustion Engines	Dr. V. Ganeshan	Tata McGraw-Hill
	6	Introduction to Internal Combustion Engines	Richard Stone	SAE International.
	7	Internal Combustion Engines	Dr. V.M. Domkundwar	Dhanpat Rai & Co
	8	Steam & Gas Turbines	R.Yadav	Central Publishing House
	9	R.K. Rajput	Thermal Engineering	Laxmi Publications.
	10	Fundamentals of I.C. Engines	H N Gupta	Prentice Hall, India
11	Engineering fundamentals of Internal combustion Engines	Willard W Pulkrabek	Prentice Hall, India	

Section A: Units I, II, and III; **Section B:** Units IV, V, and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts- sections A and B of 3 units respectively. Question paper shall be set having two sections. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

<p style="text-align: center;">Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (All)</p>				
<p>Course Code: BSH354</p>		<p>Course: Industrial Management</p>		
<p>Teaching Scheme: 04 Hrs/week</p>		<p>Class Test: 20 marks</p>		
<p>Theory: 04 Hrs/week</p>		<p>Theory Examination (Duration): 03 Hrs</p>		
<p>Credits: 04</p>		<p>Theory Examination (Marks): 80</p>		
Objectives	:	<p>1. The students should get introduced to industrial management and its implementation. 2. The students should understand system concept and its relevance with management. 3. The students should understand the role of MIS in management. 4. The students should understand latest management techniques such as JIT, TPM, Six-Sigma and its implementation</p>		
Unit-I	:	<p>Introduction to Management: Definition, history, need, science or art, types of business organizations, types of organizational structures. 06 Hrs</p>		
Unit-II	:	<p>Manufacturing Systems: Flexible Manufacturing System, Flexible Manufacturing Cell and Reconfigurable Manufacturing System. 06 Hrs</p>		
Unit-III	:	<p>Management Techniques: Just In Time, Lean, Total Productive Maintenance, Supply Chain Management, Agile Manufacturing. 12 Hrs</p>		
Unit-IV	:	<p>Management Information System: Definition, Data, Information, Data Processing, Need of Database, Role of MIS in organization.06Hrs; Decision Making: Definition, Decision making process, Decision making tools. 08Hrs</p>		
Unit-V	:	<p>Methods Engineering: Value engineering, value types, value analysis, waste, types of wastes, kaizen, five why process, process reengineering, pokayoke, workplace layout & design, Single Minute Exchange of Die 08Hrs</p>		
Unit-VI	:	<p>Six Sigma: Overview, Six Sigma-basics and history of the approach, methodology and focus, the application of Six Sigma in production and in service industries, linking Six Sigma project goals with organizational strategy. 08Hrs</p>		
Reference Books:	Sl.No	Title	Author	Publication
	1	Industrial Engineering and Management	O.P. Khanna	Dhanpat Rai & Co
	2	Just In Time Manufacturing	Korgaonkar M.G.	Laxmi Publication

	3	Total Quality Management	Besterfield Dale H., Besterfield Carol,	Pearson Education India
	4	Supply Chain Management : Strategy Planning & Operation	Chopra Sunil, Meindl Peter, Kalra D.V.	Pearson
	5	Industrial Engineering and Production and Operations Management	S. S. Patil & N K Hukeri	Electrotech Publication
	6	Management Information System	S. Sadagopan	PHI Learning
	7	The six Sigma Manual for small and Medium Business.	Craig W Baird	Atlantic Publishing Company

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Science & Technology)
Syllabus of T. Y.B. Tech. (All)

Code No.: AED381
Teaching Scheme: 04Hrs/week
Theory: 04 Hrs/week

Title: Open Elective-I (Remote Sensing & GIS)
Class Test: 20 Marks
Theory Examination (Duration): 03 Hrs
Theory Examination (Marks): 80

Credits : 4

Objectives	:	To develop applications of environmental remote sensing and GIS which can directly enhance service delivery on land use management, ground water management/prospects, agriculture, forestry, food and water security, disaster management. Present subject is designed for fulfillment of following objectives <ol style="list-style-type: none"> 1. To understand the fundamental principles and applications of Remote Sensing and Geographical Information Systems. 2. To increase awareness about RS and GIS among students for various researches pertaining to watershed management 3. To describe how geographical information is used and managed.
Unit-I	:	Remote Sensing: Definition, Historical Development, remote sensing system, Multi concept of remote sensing. Advantages and disadvantages in remote sensing, general applications of remote sensing. 08Hrs
Unit-II	:	Electromagnetic radiation: Electromagnetic energy, energy interaction with atmosphere and earth surface, resolutions in remote sensing. 08 Hrs
Unit-III	:	Sensors and Platforms: Classification, Land observation satellites, Weather satellites, Satellite data reception, transmission and processing, Data products, Standard products, Digital data products. 08 Hrs
Unit-IV	:	Image interpretation: Procedure, elements, techniques, equipments for image interpretation, basic principles of image interpretation, factors governing the quality of an image, factors governing interpretability, visibility of objects, digital image processing, digital image, steps, remote sensing in agriculture progress and prospects, microwave radiometry for monitoring agriculture crops and hydrologic forecasting, aerial photo interpretation for water resources development and soil Conservation survey. 08 Hrs
Unit-V	:	Geographical Information System: History of development of GIS definition, basic components, GIS input data and output product, general application. 08 Hrs
Unit-VI	:	GIS data: type, representation, source, data sets, acquisition, data structure, data base management systems (DBMS), GIS application. 08 Hrs

Reference Books:	:	Sl.No.	Title	Author	Publications
		1	Remote sensing and Geographical Information System	A. M. Chandra & S. K. Ghosh	Narosa Publishing House, New Delhi
		2	Remote Sensing- Principals and Applications by	B. C. Panda,	Viva book Publication, New Delhi
		3	Basics of Remote Sensing & GIS by	S. Kumar,	Laxmi Publications, New Delhi
		4	Remote Sensing & GIS	Basudeb Bhatta,	OUP India

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr.BabasahebAmbedkarMarathwada University, Aurangabad

(Faculty of Science and Technology)

Syllabus of T. Y. B. Tech. (All)

Code No.: CSE381

Title: OE-I Professional Ethics and Cyber Security

Teaching Scheme:04 Hours per week

Class Test: 20

Theory: 04 Hours per week

Theory Examination (Duration): 03 Hrs

Tutorial:

Theory Examination (Marks): 80

Credits:04

Objectives	<ol style="list-style-type: none">1.To make students familiar with the fundamental concepts of computer ethics.2. To know the linkage between computer, professional ethics and ethical decision making3.To know the ethical concepts and ethical theories4. To Know the privacy and cyberspace5. To know concept of cyber security.6. To know the practice of administrating using Cyber Security.
Unit-I	<p>: Introduction: Why Computer Ethics? The Standard Account: New Possibilities, a Vacuum of Policies, Conceptual Muddles• An Update to the Standard Account. Ethical Decision making: Ethical dilemma, Guidelines for dilemma(Formal and Informal), Solving ethical dilemma ,Socio technical Computer Ethics, Micro- and Macro-Level Analysis , Intellectual Property: Copy right, Trade mark, Trade Secret, Patent.</p> <p>08Hrs</p>
Unit-II	<p>: Professional Ethics, Codes of Conduct, and Moral Responsibility</p> <p>Professional Ethics: Profession, Professional, Computer/ IT Professional , Computer/IT Professionals Special Moral Responsibilities: Safety-Critical Software, Professional Codes of Ethics and Codes of Conduct: Purpose of Professional Codes, Criticisms of Professional Codes, Defending Professional Codes, Conflicts of Professional Responsibility: Employee Loyalty and Whistle-Blowing , Whistle-Blowing Issues, Strategy for Understanding Professional Responsibility</p> <p>08Hrs</p>
Unit-III	<p>: Ethical Concepts and Ethical Theories: Establishing and Justifying A Moral System</p> <p>Ethics and Morality: Morality, Rules and Principles of a Moral System, Ethical Theories: Consequence-Based :Utilitarianism , Duty-Based:Deontology, Contract-Based , Rights-Based Contract , Character-Based : Moral Person vs. Following Moral Rules, Acquiring the “Correct” Habits , Integrating Aspects of Classical Ethical Theories into a Single Comprehensive Theory: Moor’s Just-Consequentiality Theory</p>

	and Its Application to Cyber technology. 08Hrs																				
Unit-IV	: PRIVACY AND CYBERSPACE :Cyber technology Unique or Special, Personal Privacy: Accessibility Privacy, Decisional Privacy, Informational Privacy, Comprehensive Account of Privacy, Privacy as “Contextual Integrity”, Privacy Important: Intrinsic Value, Social Value. Gathering Personal Data: Dataveillance Techniques, Internet Cookies , RFID Technology, Cyber technology and Government Surveillance, Exchanging Personal Data: Merging Computerized Records, Matching Computerized Records . Protecting Personal Privacy in Public Space: Search Engines and the Disclosure of Personal Information, Accessing Online Public Records. 08Hrs																				
Unit-V	: Security Basics Security Basics: Introduction, Elements of Information security, Security Policy, Techniques, steps, Categories, Operational Model of Network Security, Basic Terminologies in Network Security. Intrusion and Firewall: Introduction, Intrusion detection, IDS: Need, Methods, Types of IDS, Password Management, Limitations and Challenges, Firewall Introduction, Characteristics and types, Benefits and limitations. Trusted Systems, Access Control. 08 Hrs																				
Unit-VI	: Security perspective of Hacking and its counter majors Remote connectivity and VoIP hacking, Wireless Hacking, Mobile Hacking, Hacking Hardware, Application and data Hacking, Mobile Hacking, Counter majors: General Strategies, Example Scenario’s: Desktop, Servers, Networks, Web, Database, Mobile. 08Hrs																				
Reference Books:	: <table border="1"> <thead> <tr> <th>Sl.No</th> <th>Title</th> <th>Author</th> <th>Publication</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Computer Ethics</td> <td>Deborah Johnson</td> <td>Prentice Hall PTR</td> </tr> <tr> <td>2</td> <td>Ethics and Technology Controversies, Questions, and Strategies for Ethical Computing</td> <td>HERMAN T. TAVANI</td> <td>Wiley publication</td> </tr> <tr> <td>3</td> <td>Cryptography and Information Security,</td> <td>Dr. V.K. Pachghare</td> <td>PHI</td> </tr> <tr> <td>4</td> <td>Cyber Security,</td> <td>Nina Godbole,SunitBelapure,</td> <td>Wiley India</td> </tr> </tbody> </table>	Sl.No	Title	Author	Publication	1	Computer Ethics	Deborah Johnson	Prentice Hall PTR	2	Ethics and Technology Controversies, Questions, and Strategies for Ethical Computing	HERMAN T. TAVANI	Wiley publication	3	Cryptography and Information Security,	Dr. V.K. Pachghare	PHI	4	Cyber Security,	Nina Godbole,SunitBelapure,	Wiley India
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Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each.
4. The Question no.1 and 6 should be of objective nature.
5. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (All)

Course Code: CED381		Course: Design for Environment		
Teaching Scheme: 04 Hrs/week		Class Test: 20 marks		
Theory: 04 Hrs/week		Theory Examination (Duration): 03 Hrs		
Credits: 04		Theory Examination (Marks): 80		
Objectives	:	This course has been designed to teach about environmental engineering, energy and economy through the use of case studies, computer software tools, and seminars from the point of view of sustainable development and changing societal, industrial demands. Case studies provide the basis for group projects as well as individual theses.		
Unit-I	:	Review of physical, chemical, ecological, and economic principles used to examine interactions between humans and the natural environment. Modelling concepts, applications in all engineering domains 07 Hrs		
Unit-II	:	Mass balance concepts are applied to ecology, chemical kinetics, hydrology, and transportation; energy balance concepts are applied to design, ecology, and climate change; and economic and life cycle concepts are applied to resource evaluation and engineering design. 07 Hrs		
Unit-III	:	Design for Environment (DfE) concepts, applications, and Case studies 10 Hrs		
Unit-IV	:	Assessment, Monitoring and control of Rural, Urban and Industrial Pollutions using CDTs 08 Hrs		
Unit-V	:	Numerical models are used to integrate concepts and to assess environmental impacts of human activities. Problem sets involve development of MATLAB and GIS models for engineering applications in all domains. 08 Hrs		
Unit-VI	:	Emphasis on the principles of infrastructure planning with a focus on appropriate and sustainable technologies incorporating technical, socio-cultural, public health, and economic factors into the planning and design of urban, industrial systems. 08 Hrs		
Reference Books:	Sl. No	Title	Author	Publication
	1	Ecological Water Quality (Water Treatment and Reuse)	Kostas Voudouris and Dimitra Voutsas.	McGraw Hill Publication.
	2	Wastewater Engineering-	Metcalf and Eddy	McGraw Hill Publication.

	3	MATLAB for Engineering Application-.	Williams J. Palm,	Tata McGraw Hill Publication.
	4	Application of GIS and Remote Sensing in Environmental Management-,	S. A. Abbasi	DPH Publications.
	5	"Consider a Cylindrical Cow: More Adventures in Environmental Problem Solving."	Harte, JohnMill Valley,	CA: University Science Books
	6	Energy and the Environment	Fay, James A., and Dan S. Golomb.	NY: Oxford University Press
	7	Introduction to MATLAB for Engineers and Scientists.	Etter, Dolores.	NJ: Prentice Hall
	8	"Engineering Problem Solving with MATLAB"	Etter, Dolores, David Kuncicky, and Holly Moore	Upper Saddle River, NJ: Prentice Hall
	9	"Environmental Engineering"	Howard S. Peavy, Donald R. Rowe, George Tchobanoglous	Mcgraw Higher Ed. I

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/ units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Science & Technology)
Syllabus of T. Y. B. Tech. (All)

Code No.: EED381
Teaching Scheme: 4 hrs/week
Theory: 4 hrs/week
Tutorial:-
Credits:4

Title: Open Elective-I: Robotics and Automation
Class Test (Marks): 20
Theory Examination (Duration): 3 hrs
Theory Examination (Marks): 80

Objectives	:	<ol style="list-style-type: none"> 1. Describe the history and early beginnings of automated manufacturing & Robotics. Ability to recognize industrial control problems. 2. Aims to Develop understanding Robotics Components. 3. Apply creative approaches to practical applications, identify technological opportunities in robotics. 4. An over view of technology of advanced topics such as CNC Machines, Human Robot Interaction. 5. The ability to provide Automation solution.
Unit-I	:	<p>Introduction to Automation: Types of Automation; Architecture of Industrial Automation Systems, Advantages and limitations of Automation, Effects of modern developments in automation on global competitiveness. Introduction of CNC Machines: Basics and need of CNC machines, NC, CNC and DNC (Direct NC) systems, Structure of NC systems, Applications of CNC machines in manufacturing, Advantages of CNC machines.</p> <p>08 Hrs</p>
Unit-II	:	<p>Robotics: Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems Hydraulic, Pneumatic and Electric system.08 Hrs</p>
Unit-III	:	<p>Robot Transformation, Sensors & End effectors: Transformation types: 2D, 3D. Translation- Homogeneous coordinates multiple transformation-Simple problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors Robotic vision sensor-Force sensor-Light sensors, Pressure sensors End effectors : Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers-Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems.08 Hrs</p>
Unit-IV	:	<p>Kinematics: Rigid body Kinematics, Inverse Kinematics, Rotation matrix, Homogenous transformation matrix, Denavit - Hartenberg convention, Euler angles, RPY representation, Direct and inverse Kinematics for industrial robots for position and orientation Redundancy, Manipulator, Jacobian Joint, End effector, velocity – direct and inverse velocity analysis.</p>

		Control: Individual joint computed torque. 08 Hrs			
Unit-V	:	Dynamics: Lagrangian Dynamics, link inertia tensor and manipulator inertia tensor, Newton-Euler Dynamics of Robot, Newton-Euler formulation for RR & RP manipulators, Dynamics of systems of Interacting Rigid Bodies, D-H Convention, Trajectory planning for Flexible Robot, Cubic polynomial linear segments with parabolic blending, static force and moment transformation, solvability, stiffness, Singularities. 08 Hrs			
Unit-VI	:	Robot Control & Applications 6L Control approaches: oscillatory based time varying control law, control law based on vector field orientation approach. Advanced strategies of control: conventional aerial vehicle, Bidirectional X4-flyer. Applications of Fuzzy Logic and Neural network in Robot Control, Neural controllers, Implementation of Fuzzy controllers: Trajectory tracking controller. Applications of Robotic system: complex control system, vision system in complex control system. Human Robot Interaction: Architecture. 08 Hrs			
Text books	:	Sr. No.	Title	Author	Publication
		1	Robotics And Automation Handbook	Thomas R. Kurfess,	CRC Press
		2	Robotics: Appin Knowledge Solutions (Firm)	Appin Knowledge Solutions	Infinity Science Press ,
		3	Robot Motion and Control(Recent Developments)	M.Thoma& M. Morari	Springer
Reference Books		4	Welding Robots - Technology, System Issues and Applications	J. Norberto Pires, AltinoLoureiro and Gunnar Bölmsjo	Springer-Verlag
		5	Robotics : Designing the Mechanisms for Automated Machinery	Ben-Zion Sandler,	Academic Press,

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section

3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for 10 marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Science & Technology)
Syllabus of T. Y. B. Tech. (All)

Code No.:ETC381

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Open Elective-I: Internet of Things

Class Test (Marks): 20

Theory Examination (Duration): 03 Hrs

Theory Examination (Marks): 80

Objectives	:	1. To understand IOT value chain structure (device, data cloud), application areas and technologies involved 2. To understand IOT sensors and technological challenges faces by IoT devices. 3. Explore and learn about Internet of things with the help of projects
Unit-I	:	Introduction to IoT: Definition of IOT- Evolution of IOT and related terms, hardware, software, network stack for IoT, Business Scope, SAAS Model, Industry 4.0. 08 Hrs
Unit-II	:	Elements of IoT: Introduction to elements of IOT, Basic Architecture of an IOT application sensors, and Actuators – Edge Networking (WSN) – Gateways – IOT Communication Model – WPAN and LPWA, 6LoPAN, Sigfox, Introduction to basis looping and conditional statements, basics of HTML. 08 Hrs
Unit-III	:	IoT Sensors: Node MCU ESP 8266- hardware specification, GPIO programming, WIFI connectivity programming, Access Point Programming. 08 Hrs
Unit-IV	:	Communication and Connectivity Technologies: Introduction to: TCP/IP, UDP, NTP, MQTT, Network and Sockets, WIFI. Cloud Computing in IOT - IOT Communication Model – Cloud Connectivity, Things speak, ‘100’, HCR. 08 Hrs
Unit-V	:	Data Analytics and IOT Platforms: Basics of statistics, Descriptive statistics and probability distributions. Big Data Analytics - Hadoop, Data Visualization – radar charts, – IOT Platforms- Microsoft Azure and Amazon Web Services, IBM Watson, Google Home and Amazon’s Alexa. 08 Hrs
Unit-VI	:	Preparing IoT Projects: (Creating the sensor project with Node MCU ESP 8266 - Sensor libraries - Interacting with the hardware, Internal representation of sensor values - Persisting data - External representation of sensor values - Exporting sensor data - Creating the actuator project Hardware - Interfacing the hardware - Creating a controller - Representing sensor values - Parsing sensor data - Calculating control states. 08 Hrs

Text Books:	:	Sl. No.	Title	Author	Publication
		1	The Internet of Things: Applications and Protocols,	Oliver Hersent, David Boswarthick, Omar Elloumi	Wiley publications.
		2	Architecting the Internet of Things,	Dieter Uckelmann, Mark Harrison, Florian Michahelles	Springer publications.
		3	Internet of Things with Arduino Cookbook,	Marco Schwatz	Packt Publications.
Reference Book		1	Internet of Things and Data Analytics,	HwaiyuGeng(Editor)	Wiley Publications

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3/2 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (All)

Course Code: MED381

Title: Open Elective-I: Costing and Financial Management

Teaching Scheme: 04 Hrs/week

Class Test: 20 marks

Theory: 04 Hrs/week

Theory Examination (Duration): 03 Hrs

Credits: 04

Theory Examination (Marks): 80

Objectives	:	<ol style="list-style-type: none">1. To understand the basic concepts and processes used to determine product costs,2. To be able to analyze and evaluate information for cost ascertainment, planning, control and decision making, and3. To develop ability to analyze and interpret various tools of financial analysis and planning,4. To gain knowledge of management and financing of working capital,5. To understand concepts relating to financing and investment decisions
Unit-I	:	<p>Costing Methods of costing and elements of cost.</p> <p>Material Cost Different methods of pricing of issue of materials.</p> <p>Labor Cost Different methods, wages and incentive plans. Principles of good remunerating system, labor turnover.</p> <p>Depreciation Concept, importance and different methods of depreciation 08 Hrs</p>
Unit-II	:	<p>Overheads Classification, collection of overheads, Primary and Secondary apportionment of overheads, absorption of overheads- Machine hour and labor hour rate. Under and over absorption of overheads. 08 Hrs</p>
Unit-III	:	<p>Standard costing: Concept, development and use of standard costing, variance analysis.</p> <p>Marginal Costing Use of Marginal Costing in decision-making.</p> <p>Capital Budgeting Control of Capital Expenditure, techniques of capital budgeting - Pay Back Method,</p>

		Accounting rate of return, Internal Rate of Return, DCF, Net Present Value and profitability index. 08 Hrs			
Unit-IV	:	Introduction To Financial Management Concept of business finance, Goals & objectives of financial management, Sources of financing - LONG TERM: shares, debentures, term loans, lease & hire purchase, retained earnings, public deposits, bonds (Types, features & utility), SHORT TERM: bank finance, commercial paper, trade credit & bills discounting, INTERNAL: Retained earnings, Cost of Capital & Means of Finance. 08 Hrs			
Unit-V	:	Financial Statement Preparation, analysis & Interpretation Preparation of financial statement and Profit & Loss Account, Balance Sheet. Ratio Analysis Classification, Ratio Analysis and its limitations, Index Statement & Common Size Statement. 08 Hrs			
Unit-VI	:	Working Capital Management Concept and design of Working Capital, types of working capital, sources of working capital, Time value of money, definition of cost and capital, Cash management, creditors management, debtors management. 08 Hrs			
Text Books	:	Sl.No.	Title	Author	Publication
		1	“Principles and Practice of Cost Accounting”,	Bhattacharya A. K.,	Prentice Hall India.
		2	“Cost Accounting – Methods and Problems”	B K Bhar	Academic Publishers
		3	“Financial Management”,	Khan M. Y., Jain P. K.	Tata McGraw Hill
		4	“Financial, Cost & Management Accounting”	Pariasamy P	HH Publication
Reference Books		1	“Management and Cost Accounting”	Colin Drury	English Language Book Society, Chapman and Hall London.
		2	“Financial Management”,	Tulsian P. C.,	S. Chand.

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
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Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (All)

Code No.: PPE381

Teaching Scheme: 4 hrs/week

Theory: 4 hrs/week

Tutorial:-

Credits:4

Title: Open Elective-I: Introduction to Nanotechnology

Class Test (Marks): 20

Theory Examination (Duration): 3 hrs

Theory Examination (Marks): 80

Objectives	:	1. To study the introduction to nanomaterials and the factors affecting it. 2. To study the types and synthesis methods of nanomaterials. 3. To study the characterizations and properties of nanomaterials. 4. To study the different applications of nanomaterials.
Unit-I	:	Introduction: Introduction to nanotechnology, conventional micro vs. nano-material properties, role of size in properties of nano-materials, length scale and surface to volume concept, and uniqueness of nanostructured materials; health hazards and handling of nanomaterials. 04 Hrs
Unit-II	:	A) Types of Nano-Materials: Montmorillonite, Layer double hydroxide (LDH), Carbon nanofibers (CNFs) – vapour grown carbon fibers (VGCFs), Polyhedral Oligomeric Sisoquioxane (POSS), Carbon nanotubes, Nanosilica, Nanoaluminium oxide, Nanotitaniumoxide, Nano-hybrids 04Hrs B) Synthesis: Bottom-up and Top-down approach for nano materials synthesis, Methods: Ball Milling, Chemical vapor deposition, Pressure vapor deposition, Ultrasound assisted, Minimulsion, Microemulsion, Nanoemulsion, Hydrothermal, Sol-gel, Miscellaneous techniques. 08 Hrs
Unit-III	:	Properties of Nanomaterials in terms of Structure Property Relationship: Thermal properties, Mechanical properties, Gas barrier properties, Flame retardant properties, Electrical and electrochemical properties, Electronic properties, Optical properties, Magnetic properties, Biodegradable properties, Antimicrobial properties, Catalytic properties. 08 Hrs
Unit-IV	:	Preparation of Polymer Nano composites: Solution intercalation, Melt intercalation, Roll Milling, Emulsion Polymerization, In-Situ Polymerization. 06 Hrs
Unit-V	:	Characterization of Nanomaterials and Nanocomposites: X ray diffraction (XRD), Dynamic light scattering (DLS), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Energy dispersive x-ray spectroscopy (EDS), Atomic force microscopy (AFM), Small angle X ray scattering (SAXS), Differential scanning calorimetry (DSC), Thermo gravimetric analysis (TGA). 10 Hrs

Unit-VI	:	Application of Nanomaterials and Nanocomposites: Biomedical-Drug delivery, Bone replacement; Sensors – gas sensor, Metal adsorption and recovery, Bio-molecule detectors; Energy storage and conversion - Super capacitors, Solar cells, Energy generators; Electronics; Self cleaning & Self healing paints, Nano-engineering of cement-based materials, Agricultural Nanotechnologies.		
		08 Hrs		
Reference books	:	Sr. No.	Title	Author
		1	Polymer Nan composites Processing, Characterization, and Applications	Joseph H. Koo
		2	Encyclopaedia of Nanoscience and Nanotechnology	Hari Singh Nalwa
		3	Nanoparticle Technology Handbook	M Hosokawa, K Nogi, M Naito, T Yokoyama
		4	The Science of Nanotechnology: An introductory text	Luanne Tilstra et al
		5	Polymer-Layered Silicate and Silica Nanocomposites	Y.C. Ke, P. Stroeve
		6	Nanotechnology in concrete – A review	Florence Sanchez, Konstantin Sobolev
		7	Agricultural Nanotechnologies: What are the current possibilities?	Claudia Parisi et al

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for 10 marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)				
Course Code: MED355		Course: Computational Techniques		
Teaching Scheme: 02 Hrs/week		Class Test: 10 marks		
Theory: 02 Hrs/week		Theory Examination (Duration): 02Hrs		
Credits: 02		Theory Examination (Marks): 40		
Objectives	:	1. To equip the students with a strong foundation in logic building and fast problem solving skills 2. To have thorough understanding about the use of different numerical techniques and to apply them in practical engineering applications		
Unit-I	:	Computer Arithmetic: Floating point representation of numbers, arithmetic operations with normalized floating point numbers, consequences of normalized floating representation of numbers, advantages of numerical iterative methods over exact methods, accuracy and precision, error definitions, approximations and round-off errors, truncation errors. 04 Hrs		
Unit-II	:	Roots of Equations: Bracketing methods such as Bisection method, False-position method Open methods such as Successive approximation method, Secant method Roots of Polynomial such as Muller's method, Bairstow's method 04 Hrs		
Unit-III	:	Liner and Algebraic Equation: Gauss Jordan, Matrix Inversion Method, Jacobi's Method, Gauss Seidel Iterative method, comparison of direct and iterative methods. 04 Hrs		
Unit-IV	:	Curve Fitting: Least-squares regression such as liner regression, Polynomial regression, Fitting exponential and trigonometric functions. Interpolation: Finite Differences, Newton's formulae for interpolation, Gauss central difference formulae, Hermite's interpolation formula, inverse interpolation. 04 Hrs		
Unit-V	:	Numerical Integration: Newton-Cotes Integration Formulas such as Trapezoidal rule, Simpson's rules, Integration of equations such as Romberg integration, Gauss Quadrature 04 Hrs		
Unit-VI	:	Numerical differentiation: Differentiation such as Richardson extrapolation. Ordinary differential equations such as Euler's method, Runge-Kutta method, Finite difference method. Partial differential equations such as Laplace equation, elliptic equations, parabolic equations 04 Hrs		
Text Books	:	Sl.No.	Title	Author
		1.	Numerical Algorithms	E.V. Krishnamurthy and S.S. Sen
		2	Computer oriented	V. Rajaraman
				Publication
				East West press
				Prentice Hall

		Numerical Methods		
	3	Numerical computational methods	Dr. S. S. Deo and P.P. Tawade	Technical Publications
	4	Inventory methods of Numerical	S.S. Shastry	Prentice Hall
	5	Numerical Methods in Engineering and Science	B.S. Grewal	Khanna Publications
	6	Numerical Methods	E. Balaguruswamy	TMH

Section: A Units I, II and III; Section: B Units IV, V, and VI

Pattern of Question paper:

The 6 units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 Marks Paper:

1. Minimum eight questions.
2. Four questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 5 should be of objectives nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED371 Course: Laboratory of Design of Machine Elements-II Teaching Scheme: Teachers Assessment: 25 marks Practical: 02 Hrs/week Practical : 25 marks Credits: 01	
Objectives	: 1. After successful completion of course, students shall be able to design mechanical power transmission drive and its components
List of Practical's (Not Less than 10)	: <p>A. Two full imperial sheets on following:</p> <p>1. Design and drawing sheet on any one of the following: Gear drives with two stages minimum</p> <p>2. Design and drawing sheet on any one of the following: Friction clutches, Flat belt drive, v- belt drive, wire rope drive, chain drive</p> <p>B. Assignments on following topics:</p> <p>Design of Gear Drive, Design of Friction Clutch, Design of Belt Drives, Design of Bearings, Design of Wire rope & Chain Drive, Advanced Techniques in Machine Design</p> <p>C. Case Study-II</p> <p>Case study on the design of mechanical power transmission drive involving multiple machine components: It should expose the students to some aspects of mechanical power transmission drive design such as selection and configuration of the mechanical power transmission drive and its components.</p>

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED372 Course: Laboratory of Materials and Metallurgy Teaching Scheme: Teachers Assessment: 25 marks Practical: 02 Hrs/week Practical : 25 marks Credits: 01	
Objectives	: <ol style="list-style-type: none"> 1. To understand the principal of optical microscopy 2. To prepare specimen for metallography. 3. To study microstructures of steels and non ferrous materials 4. To study heat treatment and change in the properties of metals 5. To study properties like hardness, hardenability, wear of metals
List of Practical's (Not Less than 10	: <p>Materials and Metallurgy Experiment</p> <ol style="list-style-type: none"> 1. Measurement of Hardness by Rockwell Hardness Test. 2. Study of Metallurgical Microscope. 3. Study of preparation of the specimen for microscopic examination. 4. Observation of the microstructure of various types of Plain carbon steels. 5. Observation of the microstructure of various types of cast irons. 6. Observation of the microstructure of the Non-ferrous alloys. 7. Study of changes in material properties and microstructures of various steel specimens after Heat treatments like Annealing, Normalizing and Hardening. 8. Study of Jominy end quench test to study the concept of Hardenability. 9. Study of properties of smart materials. 10. Study of change in wear resistance and other related properties of ferrous And non ferrous materials after heat treatment of steels.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED373 Course: Laboratory of Internal Combustion Engines Teaching Scheme: Teachers Assessment: 25 marks Practical: 02 Hrs/week Practical : 25 marks Credits: 01	
Objectives	: To deal effectively with practical engineering situations, including analysis, selection and performance, and design of Internal Combustion Engines and the equipments associated with it.
List of Practical's (Not Less than 10)	: <ol style="list-style-type: none"> 1. Trial on Diesel Engine with variable load & constant speed. 2. Trial on Diesel Engine with variable speed & constant load. 3. Trial on Petrol Engine with variable load & constant speed. 4. Trial on Petrol Engine with variable speed & constant load. 5. To draw the actual Valve Timing diagram for a given engine. 6. Disassembling & Assembling of the given Carburetor. 7. Morse Test. 8. Study of different types of fuel injection systems 9. Study of different types of carburetors. 10. Study of Cooling and Lubrication system. 11. Assignment on Exhaust Emission.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of T. Y. B. Tech. (Mechanical)	
Course Code: MED374 Course: Laboratory of Computational Techniques Teaching Scheme: Teachers Assessment: 50 marks Practical: 02 Hrs/week Practical : NA Credits: 01	
Objectives	: 1. To equip the students with a strong foundation in logic building and fast problem solving skills 2. To have thorough understanding about the use of different numerical techniques and to apply them in practical engineering applications
List of Practical's (Not Less than 10)	: 1. To Prepare a Program on Bisection method using C/C++/MATLAB 2. To Prepare a Program on Newton Raphson method using C/C++/MATLAB 3. To Prepare a Program on Gauss Elimination method using C/C++/MATLAB 4. To Prepare a Program on Gauss Jordan method using C/C++/MATLAB 5. To Prepare a Program on Lagrange's method using C/C++/MATLAB 6. To Prepare a Program on Newton's Forward Interpolation method using C/C++/MATLAB 7. To Prepare a Program on Least Square Approximation method using C/C++/MATLAB 8. To Prepare a Program on Newton's Backward Interpolation method using C/C++/MATLAB 9. To Prepare a Program on Trapezoidal method using C/C++/MATLAB 10. To Prepare a Program on Simpson's method using C/C++/MATLAB

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (All Branches)

Code No.:MED375

Title: Project I

Teaching Scheme: 02 Hrs/week

Practical Examination(Marks): 50

Practical: 02 Hrs/week

Credits:01

Objectives	:	The Projects in the undergraduate study of engineering aims at developing in the student, knowledge and skills to match the current and projected needs of industry, society or user systems and to create social awareness and professional attitudes. Apart from monitoring the engineering processes and maintenance of engineering work, machines and equipments, an engineer has to do investigate survey, collect data, refer handbooks/datasheets, prepare estimates and design the systems.
Contents	:	<ul style="list-style-type: none">• The completion of project is to be carried out in two semesters i.e. in T.Y. Sem. VI and final year B. Tech Sem. VII.• The students shall form project group of maximum 3 students for within department projects and maximum of 6 students in case of interdepartmental projects of their choice.• The students groups shall collect the information on the topic/area of interest and submit brief synopsis to Project Coordinator.• The Project Coordinator shall allot the Project Guide depending upon the area or specialization of eligible faculty members from the department.• The individual student from the project group shall maintain the project diary and update weekly by taking remark of respective guide.• The industry sponsored projects and inter departmental projects shall be encouraged and in case of inter departmental projects, students of maximum 3 different departments/disciplines shall work together by forming the group. The guide allotment and internal/external assessment of such groups shall be done by the respective departments.• The projects addressing issues related to environmental, rural development and societal issues shall be preferred.• The selected project shall help to promote participation in government approved schemes like Unnat Maharashtra Abhiyaan (UMA) and Unnat Bharat Abhiyaan (UBA).• The students shall aim to promote their project work in project exhibitions/competitions, paper presentation/publication in reputed journals

and conferences.

- The relevance of project and implementation including details of attainment of POs and PSOs addressed through the projects with justification must be clearly stated.

Phases of Project Part- I:

Phase I: Problem Identification, Literature survey, data collection, deciding scope of topic and objectives of the project.

Phase II: Confirmation of block diagram or layout of the proposed project.

Phase III: Submission of small report of project work.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science and Technology)

Syllabus of T.Y.B. Tech. (All) Semester-VI

Code No.: BSH801

Title: Audit I: Japanese Language module

Teaching Scheme:02 Hours per week

Examination Scheme

Theory: 02 Hours per week

Total Marks: 50 (Continuous Assessment)

Objectives	<ul style="list-style-type: none">• Students will be able to apply communicative Japanese Grammar in communication.• Students will be able to enhance the level of Japanese vocabulary.• Students will be able to pronounce and articulate words as well as sentences accurately.• Students will be able to understand and apply Japanese language eventually.• Students will be able to develop Japanese language skills.• Students will be able to manage situational communication in Japanese.
Unit-I	: Kana scripts Hiragana & Katakana <p style="text-align: right;">[2 Hours]</p>
Unit-II	: Chinese characters Kanji- Pictograms with stroke order <p style="text-align: right;">[2 Hours]</p>
Unit-III	: Grammar Parts of speech, articles , word order or syntax, demonstratives & interrogatives, counters, verbs and verb conjugation, adjectives, adverbs, comparisons, giving and receiving, requests and commands, potential and conditionals, possessive, direct indirect speech, various other form, etc <p style="text-align: right;">[8 Hours].</p>
Unit-IV	Vocabulary Nouns, verbs tenses-past and present, adjectives, adverbs, expressions of time ,

		expression and phrases etc.		[5 Hours]
Unit-V		Situational conversations and practice drills Self-introduction, numbers, day and date, time, location and presence, possession of objects, time expressions and their usage, visiting people, accepting and receiving objects, hospital, asking direction, asking price of objects etc.		[5 Hours]
Unit-VI		Introduction to the history of Japan and its cultural Aspects Ikebana, origami, calligraphy, kabuki etc		[2 Hours]
List of Reference	Sr. No.	Title	Author	Publication
Books	1	Japanese Kanji for Beginners	Timothy G. Stout and Kaori Hakone	Tuttle Publishing
	2	Essential Japanese Grammar: A Comprehensive Guide to Contemporary Usage	Masahiro Tanimori and Eriko Sato Ph.D.	Tuttle Publishing
	3	15-Minute Japanese: Learn in Just 12 Weeks	D.K. Goel and Rajesh Goel	Amazon.in
	4	Oxford Japanese Grammar and Verbs (Dictionary)	Bunt Jonathan	Oxford Publication
	5	Read and write Japanese scripts: Teach yourself	Helen Gilhooly	Teach Yourself
	6	Complete Japanese Beginner to Intermediate Book and Audio Course: Learn to read, write, speak and understand a new language with Teach Yourself	Helen Gilhooly	Teach Yourself

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science and Technology)

Syllabus of T.Y.B. Tech. (All)

Code No.: CSE801

Teaching Scheme: 02 Hours per week

Theory: 02 Hours per week

Tutorial:

Credits: NIL

Title: Audit I: Cyber crime and law

Class Test: 10

Theory Examination (Duration): 02 Hrs

Theory Examination (Marks): 40

Objectives	<ol style="list-style-type: none">1. To introduce the cyber world and cyber law in general2. To enhance the understanding of problems arising out of online transactions and provoke them to find solutions3.. To examine the effects of cyber crime through the experiences of victims and law enforcement4. To Know the technologies that stand behind certain cyber crimes,5. Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.6. Students distinguish enforceable contracts from non - enforceable contracts.
Unit-I	: Introduction Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level. 04 Hrs
Unit-II	: Jurisdictional Aspects in Cyber Law Issues of jurisdiction in cyberspace, Types of jurisdiction, The Test evolved, Minimum Contacts Theory, Sliding Scale Theory, Jurisdiction under IT Act, 2000. 04 Hrs
Unit-III	: Cyber Crimes & Legal Framework Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Identity Theft & Fraud, Cyber Terrorism, Right to Privacy and Data Protection on Internet, Different offences under IT Act, 2000 04 Hrs
Unit-IV	: Digital signature and Electronic Signature and Data Protection Concept of public key and private key, Certification authorities and their role, Creation and authentication of digital signature, Concept of electronic signature certificates, Electronic Governance 04 Hrs
Unit-V	: E Contracting & E Commerce Salient features of E-contract, Formation of E-contract and types, E-mail Contracting, Indian Approach on E-contracts, E-commerce-Salient Features and advantages, Models of E-commerce

	like B2B, B2C, Indian Laws on E-commerce. 04 Hrs																				
Unit-VI	: Intellectual Property Issues in Cyber Space Copyright Law, Patent Law, Trademarks & Domain Names Related issues, Dispute Resolution in Cyberspace. 04 Hrs																				
Reference Books:	<table border="1"> <thead> <tr> <th>Sl.No</th> <th>Title</th> <th>Author</th> <th>Publication</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Compters, Internet and New TechnologyLaws,</td> <td>Karnika Seth,</td> <td>Lexis NexisButterworthsWadhwa Nagpur.</td> </tr> <tr> <td>2</td> <td>Computer Law,</td> <td>Chris Reed & John Angel,</td> <td>OUP, New York</td> </tr> <tr> <td>3</td> <td>Cyber Crime An Introduction</td> <td>Prasad R.S.</td> <td>ICFAI University Press</td> </tr> <tr> <td>4</td> <td>Cyber Laws</td> <td>Ed. Kumar Krishna</td> <td>Dominant publishers & distributors Pvt. Ltd.</td> </tr> </tbody> </table>	Sl.No	Title	Author	Publication	1	Compters, Internet and New TechnologyLaws,	Karnika Seth,	Lexis NexisButterworthsWadhwa Nagpur.	2	Computer Law,	Chris Reed & John Angel,	OUP, New York	3	Cyber Crime An Introduction	Prasad R.S.	ICFAI University Press	4	Cyber Laws	Ed. Kumar Krishna	Dominant publishers & distributors Pvt. Ltd.
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Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:-

The six units in syllabus shall be divide in two equal parts i.e.3 units respectively. Question paper shall be set having two sections A & B. Section-A question shall be on first part & section question on second part. Question paper should cover entire syllabus.

For 40 marks paper:-

1. Minimum eight questions.
2. Four question in each section.
3. Question no.1 from section A & Question no. 5 from section-B made compulsory & should cover complete syllabus of the respective section& should be set for six marks each. The question no.1 & 5 should be of objective nature.
4. Two question of 07 marks each from remaining question, from each section A & B asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Engineering and Technology)

Syllabus of Third Year B. Tech. (All)

Code No.: CED801

**Course Title: Audit I: Road Safety Management
Audit**

Teaching Scheme:

Class Test (Marks): 10

Theory: 02 Hrs./ week

Theory Examination (Duration): 02hrs

Credits: NIL

Theory Examination (Marks): 40

Course Objectives	:	<ol style="list-style-type: none">1. To acquire knowledge and understanding of the road environment.2. To inculcate decision making and behavioural skills necessary to survive in the road environment.3. To impart knowledge and understanding of the causes and consequences of accidents.4. To understand roles and responsibilities in ensuring road safety.
Unit-I	:	<p>Introduction to Road Safety & Planning.</p> <p>Road traffic accidents scenario in India and in world. Road Safety and its importance. Traffic Rules and Driving Behaviour. Characteristics of accidents, accidents vs. crash. Need of Road Safety. Awareness about rules and regulations of traffic. Assisting Traffic control authorities. Multidisciplinary approach to planning for traffic safety and injury control. Vulnerable road users: crashes related to pedestrian and bicyclists, their safety, provision for disabled.</p> <p style="text-align: right;">04 Hrs</p>
Unit-II	:	<p>Traffic Signs, signals & traffic furniture & Role of traffic signals.</p> <p>Warning, cautioning & Informing sign. Location of Road sign, Traffic signals. Road Marking: Colour of road marking, kerb marking, night driving aid, traffic light signals. Types of Signals. Road safety tips for different categories of Road users. Causes of accidents, prevention & 1st aid to accident victim. Rules on road. Necessity of traffic lights. Major violations leading to accidents.</p> <p style="text-align: right;">04 Hrs</p>
Unit-III	:	<p>Responsibility of Road accidents and Safety measures.</p> <p>People responsible for accident prevention: Police, Politicians, Community members, Policy makers, Teachers, Parents, Infrastructure authorities, Drivers and Official road safety body. Reasons of students/ children have accidents. 4 E's of Accidents Prevention: 1. Engineering - by altering the environment 2. Enforcement - by imposing laws 3. Encouragement - by the use of publicity campaigns 4. Education - by gaining and using knowledge.</p> <p style="text-align: right;">04 Hrs</p>

Unit-IV	:	Road Safety Education & Events. Introduction to Road Safety Education. 5 P's of Road safety education: 1. Pre-school road safety education 2. Practical rather than theory education 3. Principles of own development about road safety education 4. Presentations on road safety education 5. Place for road safety education in syllabus. Discussions on efforts done by Government on Road Safety. Workshop on Road Safety week/ Organization of seminar on Road Safety. 04 Hrs			
Unit-V	:	Traffic Flow Analysis. Macroscopic, Microscopic & Mesoscopic approach Types of Flow, Traffic stream characteristics ,Space, Time diagram, Relationship between speed, flow & density, Level of service & capacity analysis, Shockwave theory. 04 Hrs			
Unit-VI	:	Road Safety Audit. Global & Local perspective, Road safety issues, Road safety programmes, types of RSA, planning, design, construction & operation stage audits ,Methodology , Road safety audit measures 04 Hrs			
Text Books	:	Sl.No	Title	Author	Publication
		1	Traffic Flow Theory & Control.	D. R. Drew	McGraw Hill, New York
		2	Traffic Engineering and Transport Planning	L.R. Kadiyali	Khanna Publishers, New Delhi
		3	Transportation Engineering-An Introduction	C. J. Khisty	Prentice-Hall, NJ
		4	Traffic Flow Fundamentals	A. D. May	Prentice – Hall, Inc., New Jersey
		5	Highways- Traffic Planning & Engineering	C. A. O'Flaherty	Edward Arnold, UK
		6	Traffic Engineering – Theory & Practice	L. J. Pignataro	John Wiley
		7	Highway Traffic Analysis and Design	R. J. Salter, N. D. Hounsel	Macmillan, London,

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:-

The six units in syllabus shall be divide in two equal parts i.e.3 units respectively. Question paper shall be set having two sections A & B. Section-A question shall be on first part & section question on second part. Question paper should cover entire syllabus.

For 40 marks paper:-

1. Minimum eight questions.
2. Four question in each section.
3. Question no.1 from section A & Question no. 5 from section-B made compulsory & should cover complete syllabus of the respective section& should be set for six marks each. The question no.1 & 5 should be of objective nature.
4. Two question of 07 marks each from remaining question, from each section A & B asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Engineering & Technology)

Syllabus of T. Y. B. Tech. (All)

Code No.: BSH802

Teaching Scheme: 02 Hours per week

Theory: 02 Hours per week

Title: Audit I: Value Education

Examination Scheme

Total Marks: 50 (Continuous Assessment)

Objectives	:	<ol style="list-style-type: none">1. Understand the need of values and its classification in contemporary society.2. Appreciate the values needed for peaceful society like democratic, secular, and socialist etc.3. Become aware of role of education in building value as dynamic social reality.4. Know the importance of value education towards personal, national and global development.
Unit-I	:	Introduction to Value Education: Value Education, Purpose of Value Education as specifying the present deterioration in the value system in the fast changing world trends. 04 Hrs
Unit-II	:	Importance of Values in Life: What is a Value system? What kinds of values need to be inculcated? Eg. Ethical, moral and spiritual instead of materialistic values, value inculcation, trend of values such as a permissive culture. 04 Hrs
Unit-III	:	Character Building: Advantages of good character, importance of trust, honesty, integrity, morality, and reliability as qualities of a good character. Building Relationship-Group Behaviour, limitations of a relationship. How to be a better person, better manager and better Engineer? 04 Hrs
Unit-IV	:	The Purpose of Life & Education: Meaning, purpose of one's life, Destination success - why are you here? How to make everyday worth living? 04 Hrs
Unit-V	:	Values For Personal Life & Professional Life: Self sovereignty-Discernment-Decision making-Self-actualization, Caring-Patience-Honesty-Forgiveness, Competence-Cooperation-Perseverance, Flexibility-Reliability-Tolerance-Unity-Knowledge Thirst, Sincerity in Profession, Regularity, Punctuality, Faith. 04 Hrs
Unit-VI	:	Value Education towards National and Global Development: Constitutional Values: Sovereign, Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom, Fraternity; Social Values: Pity and Probity, Self-Control, Universal Brotherhood. Religious and Moral Values: Tolerance, Wisdom, character; Aesthetic Values: Love and Appreciation of literature, fine arts and respect for the same; Environmental Ethical Values; National Integration and international understanding; Need of Humanistic value for espouse peace in the society; Conflict of cross-cultural influences, cross-border

		education.04 Hrs			
Text books	:	Sr. No.	Title	Author	Publication
		1	Moral and Value Education; Principles and Practices	Sharma, S.P.	Kanishka publishers,
		2	Value Education	Kiruba Charles & V. Arul Selvi.	Neelkamal Publications, New Delhi.
Reference Books	:	3	Value Education.	Passi, B.K. and Singh, P.	National Psychological Corporation, Agra.
		4	Education and Human Values	Chitakra M.G	A.P.H. Publishing Corporation, New Delhi.
		5	Values in Education and Education in Value.	Monica J. Taylor.	Routledge
		6	The End of Education: Redefining the Value of School.	Neil Postman.	Vintage publisher
Additional resources:	:	1	http://cbseportal.com/exam/e-books/download-free-ncert-e-book-education-for-values-in-school-a-framework\		
		2	http://cbseacademic.in/web_material/ValueEdu/Value%20Education%20Kits.pdf		

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:-

The six units in syllabus shall be divide in two equal parts i.e.3 units respectively. Question paper shall be set having two sections A & B. Section-A question shall be on first part & section question on second part. Question paper should cover entire syllabus.

For 40 marks paper:-

1. Minimum eight questions.
2. Four question in each section.
3. Question no.1 from section A & Question no. 5 from section-B made compulsory & should cover complete syllabus of the respective section& should be set for six marks each. The question no.1 & 5 should be of objective nature.
4. Two question of 07 marks each from remaining question, from each section A & B asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Engineering & Technology)

Syllabus of T. Y. B. Tech. (All)

Code No.: ETC801

Teaching Scheme:02 Hours per week

Theory: 02 Hours per week

Title: Audit I: Smart Cities

Examination Scheme

Total Marks: 50 (Continuous Assessment)

Objectives	:	<ol style="list-style-type: none">1. To identify urban problems.2. To study Effective and feasible ways to coordinate urban technologies.3. To study models and methods for effective implementation of Smart Cities.4. To study new technologies for Communication and Dissemination.5. To study new forms of Urban Governance and Organization.
Unit-I	:	Understanding Inclusive Planning Definition and components; urban consultations; basic principles of urban consultation, process of urban consultations; urban strategic planning, good urban governance, subsidiary, equity, efficiency, transparency and accountability, civic engagement and citizenship, security; valuing difference and working with diversity; livable cities. 04 Hrs
Unit-II	:	Participatory Planning Process and Policies, Programmes and Legislation Methods, role of stakeholders (including civil society organizations),etc.; Related Acts, Five year plans, policies and programmes at various levels 04 Hrs
Unit-III	:	Smart Cities Innovation economy (Innovation in industries, clusters, districts of a city; Knowledge workforce: Education and employment; Creation of knowledge-intensive companies) 04 Hrs
Unit-IV	:	Smart Cities Urban Infrastructure (Transport, Energy/ Utilities, protection of the environment and safety); Governance(Administration services to citizens, participatory and direct democracy, services to the citizen, quality of life) 04 Hrs
Unit-V	:	Planning interventions -I Inclusive zoning, development and building regulations, Slum Improvement; drafting strategic urban development plans – objectives and key actors; planning framework for actions, process of drafting the plan, key considerations. 04 Hrs
Unit-VI	:	Planning interventions -II Urban design and decision-making; city transport for all; water supply and sanitation, urban disaster management, management through decentralization 04 Hrs

Reference Books	Sr. No.	Title	Author	Publication
	1	“A city for all: valuing differences and working with diversity”	Jo Beall	Zed books limited, London (ISBN: 1-85649-477-2)
	2	UN-Habitat; “Inclusive and sustainable urban planning: a guide for municipalities”; Volume 3:	Urban Development Planning (2007)	United Nations Human Settlements Programme (ISBN: 978-92-1-132024-4)
	3	“Insights into inclusive growth, employment and wellbeing in India”	Arup Mitra	Springer (2013), New Delhi (ISBN: 978-81-322-0655-2)
	4	“Urban Planning and cultural identity”	William J. V. Neill (2004);	Routledge, London (ISBN: 0-415-19747-3)
	5	“Remaking the city: Social science perspective on urban design”;	John S. Pipkin, Mark E. La Gory, Judith R. Balu (Editors);	State University of New York Press, Albany (ISBN: 0-87395-678-8)
	6	"Smart cities – Ranking of European medium-sized cities". Smart Cities.	Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; Nataša Pichler-Milanovic; Evert Meijers.	Vienna: Centre of Regional Science
	7	"Draft Concept Note on Smart City Scheme". Government of India - Ministry of Urban Development (http://indiainsmartcities.in/downloads/CONCEPT_NOTE_3.12.2014__REVISED_AND_LATEST_.pdf)	Government of India - Ministry of Urban Development	Government of India - Ministry of Urban Development

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:

1. Minimum 8 questions
2. Four questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for 6 marks each. The Question no.1 and 5 should be of objective nature.
4. Two questions of 14 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Engineering & Technology)

Syllabus of T. Y. B. Tech. (All)

Code No.: MED- 801

Teaching Scheme:02 Hours per week

Theory: 02 Hours per week

Title: Audit I:Rural Community Engagement

Examination Scheme

Total Marks: 50 (Continuous Assessment)

Objectives	:	1. To provide practical opportunities for students for participation in rural community mobilization, service engagement and empowerment activities. 2. To promote preparation of strategies for building resilience and community responding system in nutrition, water, food safety and healthcare.			
Unit-I	:	Dynamics Of Rural Society, Panchayat Raj System: Social, Economic, Political and Cultural Community Goal Setting : SAGY, MPLADS, UMA and UBA 04 Hrs			
Unit-II	:	Approaches and Methods, Community Project Proposal and Project Management, Concept and Steps, Thematic Maps, Social Map Transect Walk, Seasonal Map, Natural and Human Resource Mapping and Management, Ethnographic Research 04 Hrs			
Unit-III	:	Vulnerability, Rural Resilience - Risk Reduction, Role and Responsibilities Rehabilitation: Social, Physical and Psychological Aspect Increasing Efficiency in Water, Energy, Sanitation and Waste (Solid and Liquid) Management 04 Hrs			
Unit-IV	:	Engagement With School for Competency Enhancement/Health Centre/Panchayat/Gram Sabha/SHGs Awareness: Rural Health Management, Indigenous or Folk Medicine and Hygiene/ Sports/ Rights/ Policies and Programs/ Transparency/Corruption/Social Benefits, addressing Issue In inclusive and Inclusive Identification of Beneficiaries, Improving Implementation Efficiencies While Plugging Leakages In Benefits Scheme, Direct Benefit Transfer 04 Hrs			
Unit-V	:	Making of Gram Panchayat Development Plan Including Aspects and Process of Preparation of Village Disaster Management Plan. 04 Hrs			
Unit-VI	:	Village Livelihoods, Rural Tourism, Entrepreneurship, Appropriate Technology Access Including Digitized Transaction. 04o Hrs			
Reference Books:	:	Sl.No	Title	Author	Publication
		1	Rural development-Principles, Policies and Management”	Katar Singh “	SAGE Publication
		2	“Sadguru Model of Rural Development: Elevates Food Security and Ease Poverty”	AgoramoorthyGovi ndaswamy	Daya Publishing House, a division of Astral International Pvt.

					Limited, 2016
		3	Technological Change for Rural Development in India”.	V.GopalkrishnanA sari “	B.R.Publisher
		4	“Cooperatives And Rural Development In India”	B.S.Gautam	Radha Publications

Section A: Units I and II **Section B:** Units III and IV.

Pattern of Question Paper:

The four units in the syllabus shall be divided in two equal parts- sections A and B of 2 units respectively. Question paper shall be set having two sections. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:

5. Minimum Eight questions
6. Four questions in each section
7. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 5 should be of objective nature.
8. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science and Technology)

Syllabus of T.Y.B. Tech. (All) Semester-VI

Code No.: BSH803

Title: Audit I: German Language Module

Teaching Scheme: 02 Hours per week

Examination Scheme

Theory: 02 Hours per week

Total Marks: 50 (Continuous Assessment)

Objectives	<ul style="list-style-type: none">• Students will be able to apply communicative German Grammar in communication.• Students will be able to enhance the level of German vocabulary.• Students will be able to pronounce and articulate words as well as sentences accurately.• Students will be able to understand and apply German language eventually.• Students will be able to develop German language skills.• Students will be able to manage situational communication in German. .
Unit-I	: Significance and purpose The Significance of Language study, Speaking and Thinking , Self – discovery, Communication, Language Competence, Language and Culture, Language Changes, Connection with other areas of study, The Mother—language, Other languages and Purpose of Language study [2 Hours]
Unit-II	: Purpose of the Study of the German Language Listening, Speaking, Reading and writing. [2 Hours]
Unit-III	: Grammar Parts of speech, articles , word order or syntax, demonstratives & interrogatives, counters, verbs and verb conjugation, adjectives, adverbs, comparisons, giving and receiving, requests and commands, potential

	and conditionals, possessive, direct indirect speech, various other form, etc. [8 Hours]
Unit-IV	Vocabulary Nouns, verbs tenses-past and present, adjectives, adverbs, expressions of time , expression and phrases etc. [5Hours]
Unit-V	Situational conversations and practice drills Self-introduction, numbers, day and date, time, location and presence, possession of objects, time expressions and their usage, visiting people, accepting and receiving objects, hospital, asking direction, asking price of objects etc. [5 Hours]
Unit-VI	Introduction to the history of German and its cultural Aspects Norms and values, Lifestyles and aims in life, Cultural traditions [2 Hours]

List of Reference	Sr. No.	Title	Author	Publication
Books	1	German Made Simple: Learn to speak and understand German quickly and easily	Arnold Leitner PhD	Namrata's Amazon.in
	2	The Everything Learning German Book: Speak, write, and understand basic German in no time	Edward Swick	Adams Media
	3	Langenscheidt German in 30 Days	Von Angelika G. Beck	Langenscheidt
	4	Complete German Beginner to Intermediate Book and Audio Course: Learn to read, write, speak and understand a new language with Teach	<u>Heiner Schenke</u>	The McGraw Hill

		Yourself		
	5	German: How to Speak and Write It (Beginners' Guides)	Joseph Rosenberg	Repro Books
	6	Collins Easy Learning – Collins Easy Learning German Grammar and Practice	Collins	Collins