

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO.SU/Engg./B.Tech./41/2022

It is hereby inform to all concerned that, the syllabi recommended by the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor **has accepted revised following syllabi of Bachelor of Technology Final Year (VII & VIII semester) in accordance with Choice Based Credit & Grading System as per guidelines of AICTE** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

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

This is effective from the Academic Year 2022-23 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/2022/ 15213-22
Date:- 11.11.2022.

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*Deputy Registrar,
Academic Section*

Copy forwarded with compliments to :-

- 1] **The Principal of all 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, Dr.BAMU,A'bad.**
- 2] The Section Officer,[Engg.Unit] Examination Branch,Dr.BAMU,A'bad.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU,A'bad.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU,A'bad.
- 5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU,A'bad.
- 6] The Public Relation Officer, Dr.BAMU,A'bad.
- 7] The Record Keeper, Dr.BAMU,A'bad.

**Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad**



**Revised Syllabus of Final Year Bachelor of
Technology**

**Civil Engineering
(VII & VIII Semester)**

Under Choice Based Credit System (CBCS)

Under Faculty of Science and Technology

(Effective from 2022-23 and onwards)

FACULTY OF SCIENCE AND TECHNOLOGY
Syllabus Structure w.e.f. 2022-2023 (Choice Based Credit System)
Final Year B. Tech. (Civil Engineering)

Semester-VII

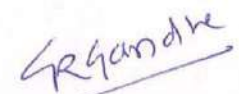
Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks							Credits			
		Theory	Practical	Tutorial	MSE-I	MSE-II	TA	ESE	TW	PR/OR	Total	TH	TW/PR	TUT	Total
CED 401	Estimating and Costing	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED 402	Highway Engineering	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED 403	Construction Management	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED 431 to 433	Professional Elective Courses-IV	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED481	Open Elective-III: Town Planning	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED 411	Lab 1: Estimating and Costing	-	2	-	-	-	-	-	-	25	25	-	1	-	1
CED 412	Lab 2: Highway Engineering	-	2	-	-	-	-	-	-	25	25	-	1	-	1
CED 413	Lab-3: Construction Management	-	2	-	-	-	-	-	50	-	50	-	1	-	1
CED 414	Major Project-II	-	8	-	-	-	-	-	50	50	100	-	4	-	4
		15	14	-	75	75	50	300	100	100	700	15	7	-	22

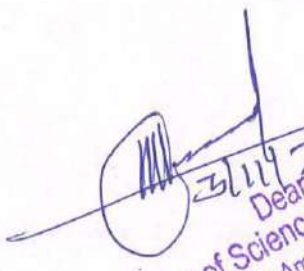
Semester-VIII

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks							Credits			
		Theory	Practical	Tutorial	MSE-I	MSE-II	TA	ESE	TW	PR/OR	Total	TH	TW/PR	TUT	Total
CED 451	Internship	-	-	-	-	-	-	-	300	300	600	-	20	-	20

MSE- Mid Semester Exam, ESE- End Semester Examination, TH-Theory, OR- Oral, TA-Teacher Assessment, TW- Term Work, PR- Practical, Tut- Tutorial


Dr. Uttam Kulkarni


(Dr. G. R. Girish)
HOD
Civil Engineering Department
Deogiri Institute of Engineering
and Management Studies
Aurangabad


Dean
Faculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

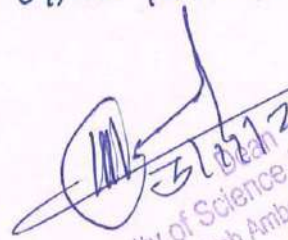
List of Professional Elective Course-IV (Semester VII):

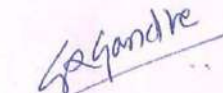
Group A (CED 421)	Group B (CED 422)	Group C (CED 423)
Rural Water Supply	Earthquake Engineering	Advance Geotechnical Engineering

List of Open Elective-III (Semester VII):

Sr. No.	Offered by Department	Name of Course	Course Code
1.	Agricultural Engineering	Ecology and Environmental Pollution	AED431
2.	Civil Engineering	Town Planning	CED431
3.	Computer Science and Engineering	Big Data Analytics	CSE431
4.	Electrical Engineering	Battery Management System	EED431
5.	Electronics and Telecommunications Engineering	Data Science	ETC431
6.	Mechanical Engineering	Modern Management Techniques	MED431
7.	Plastic and Polymer Engineering	Packaging Technology	PPE431


Dr Uttam Kalwane


Dean
Faculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad


(Dr. G. R. Gandhe)
HOD
Civil Engineering Department
Deogiri Institute of Engineering
and Management Studies
Aurangabad

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. final year (Civil Engineering) Semester - VII	
Course Code: CED401 Course: Estimating and Costing Teaching Scheme: Theory: 03 Hours/week Practical: 02 Hours/week Credits: 3-1-0	Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hours Term Work: 25 Marks
Prerequisite	Introduction to basic properties of material and concept of valuation and rate analysis.
Course Objectives	1. To understand What is Estimating and Costing 2. To understand the Various Concepts of Estimating and Costing
Unit-I	Introduction: Importance and purpose of the subject, Units of measurement as per I.S.1200, Items of work and Description of items of work, administrative approvals, technical sanction, preliminary estimates, objectives, and its methods Earthwork estimates in road, hill roads and canals, mass haul curves, methods of consumptions of earthwork. (4Hrs)
Unit-II	Detailed estimates: objects, importance, accuracy. Methods of detailed estimates, Detailed estimates of load bearing and framed structures. Calculation of reinforcing steel with Bar bending Schedule (6Hrs)
Unit-III	Tenders and Contracts: Method of carrying out works, tender notice, acceptance of tender, essentials of contract, type of contracts, contract documents, land acquisition act, Legal aspects of various contract provisions, Arbitration (6Hrs)
Unit-IV	Specifications: IS 1200 Introduction, Purpose and principles of specifications writing, Types of specifications, writing and developing detailed specifications of Important items of building and road work. Cost Accounting: Various methods, classification of cost, direct and indirect charges, distribution of overheads, M.A.S. Account, issue rates and stores Account. (8Hrs)
Unit-V	Rate Analysis: Introduction, Purpose and principles of CSR, Factors affecting analysis of rates, labour guidelines from National Building Organization, market rates of materials and labour, Rate analysis of major items of work. (6Hrs)
Unit-VI	Valuation: Purpose of valuation, Factors affecting property price and cost, Types of Value. Real Estate, Tenure of land, Free hold, and lease hold, sinking fund, Depreciation, and its methods, Capitalized value, Methods of valuation, Net & Gross income, Rent fixation. (6Hrs)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1.	Estimating and Costing	B.N. Dutta	UBS Publishers'	27 th edition
2.	Estimating & Costing	M. Chakraborty	Chakraborty Publishers'	3rd edition
3.	Valuation	Roshan Namavati	Namavati Publishers'	1st edition
4.	Philosophy of Valuation.	S. S. Rathore.	Allied Publishers Pvt. Ltd	1 st edition

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. final year (Civil Engineering) Semester - VII	
Course Code: CED402 Course: Highway Engineering Teaching Scheme: Theory: 03 Hours/week Practical: 02 Hours/week Credits: 3-1-0	Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hours Term Work: 25 Marks
Course Objectives	- To provide a coherent development to the students for the courses in sector of Engineering like Transportation & Traffic Engineering etc. - To present the foundations of many basic Engineering tools and concepts related Highway Engineering. - To give an experience in the implementation of Engineering concepts which are applied in field of Transportation Engineering. - To involve the application of scientific and technological principles of planning, analysis, design, and management to highway engineering.
Unit-I	Highway Development and Planning: Historical Development of roads, development of highway planning in India, Road patterns, Engineering survey in highway alignment. Highway Materials: Soil, Aggregates, Bitumen, Futuristic Pavement Materials. (06 Hours)
Unit-II	Geometric Design of Highway: Cross sectional elements, Camber, Gradient, and Sight distance, PIEV Theory. Horizontal Alignment, Super elevation, Extra widening, transition curves, Set back distance. Vertical Alignment, Design of summit & valley-curves. (06 Hours)
Unit-III	Design of Flexible Pavement: Design factors. ESWL for dual wheels. Tire and contact pressure. Group index method, CBR method, Bossiness's & Burmister's method. Marshall Mix Design. (06 Hours)
Unit-IV	Design of Rigid Pavement: Westergaard's stress equation for wheel load & Temperature stresses in rigid pavement, Combination of stresses, Design of Joints. Macadam roads. (06 Hours)
Unit-V	Traffic Engineering: Road user characteristics, vehicular characteristics, traffic flow characteristics, speed, traffic volume studies, parking studies. Accident studies. Traffic control devices. Types of intersection and their design concept. (06 Hours)
Unit-VI	Highway Construction Machinery: Earth moving equipment's, application, and specification: Backhoe loader, Crawler Excavator, Motor Grader, Road Rollers machine, tippers, Cranes and Hydra machine, Paver machine and its type, Asphalt Mixing Plants. (06 Hours)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1.	Highway Engineering	Khanna & Justo	Nemchand Publishers	3 rd edition
2.	Principles and Practice of Highway Engineering	Kadiyali L.R.	Khanna Technical Publications	8 th edition
3.	Introduction to Transportation Planning	M. J. Bruton	Hutchinson of London Ltd.	1st edition
4.	Traffic Engineering and Transport Planning	Kadiyali L. R.	Khanna Publishers	1 st edition
5.	Metropolitan transportation planning	John W. Dickey	Tata Mc Graw Hill, New Delhi	3rd edition

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. final year (Civil Engineering) Semester - VII	
Course Code: CED403 Course: Construction Management Teaching Scheme: Theory: 03 Hours/week Practical: 02 Hours/week Credits: 3-1-0	Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hours Term Work: 50 Marks
Prerequisite	Basics of analysis of construction site and quality of materials.
Course Objectives	1. Learn various basic concepts like safety, site layout related to Construction Management. 2. Understand important aspect of managing the construction project with the help of various networking techniques like Bar Chart / Milestone Chart, CPM, PERT and Precedence networks. 3. Apply various material management theories like ABC, EOQ, HML etc. 4. Understand economic analysis and financial management concepts to know economic feasibility of construction projects.
Unit-I	Time Management: Introduction, steps in Project Management – work break down structure, Bar Chart, Mile stone chart, Gantt Chart, Activity on Arrow and Activity On node. Introduction to PERT: Concept of probability, normal and Beta Distribution, Central limit theorem. Time estimates and calculations of project duration, critical path, slack, probability of project completion. (08 hours)
Unit-II	Network Analysis: Precedence network, Critical Path Method (CPM): Introduction, Time estimates, floats, critical path, Network compression – Least Cost and optimum duration, updating of networks– needs, steps, project duration, calculation for updated network. (08 hours)
Unit-III	Resource Management: Human Resource allocation – smoothing and levelling, Material Management- definition by international federation of purchasing and material management. Objectives, Role Functions, Qualities of material manager material forecasting. Inventory Control- Necessity, Techniques such as ABC and EOQ lead-time, safety stocks, Material Evaluation using differential indices. (06 hours)
Unit-IV	Financial Management: Introduction to Engineering economics, importance, demand and supply, types of costs, Types of interest such as – simple, compound, continuous, effective. Value of Money – time and equivalence, tangible and intangible factors, introduction to inflation. (06 hours)
Unit-V	Economic Analysis: Economic comparisons, Discounting methods: Present worth method, equivalent annual cost method, capitalized cost method, net present value, and internal rate of return. (04 hours)

Unit-VI	Safety Engineering: Site layout, Factors affecting, Typical layout of few major construction projects, Importance of Safety, Classification of Accidents, Causes of Accidents, Safety Policy, Safety Organization, Safety Plan, Safety Training, Various Safety Equipment used on site. (04 hours)
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REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1.	Construction Project Management	Jha K. N.	Pearson's publication.	3 rd edition
2.	Construction Management and Planning	Sengupta, B. and Guha H.	Tata McGraw Hill Publication.	3 rd edition
3.	PERT & CPM: Principles and Applications	Srinath. L. S.	Affiliated East West Press, Delhi	1 st edition
4.	Project Planning and Control with PERT and CPM	B. C. Punmia,	Laxmi Publications (P) Ltd.	1 st edition
5.	Industrial Engineering & management	O. P. Khanna	Dhanpat Rai Publications.	3 rd edition

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. final year (Civil Engineering) Semester - VII	
Course Code: GED421 Course: Rural Water Supply Teaching Scheme: Theory: 03 Hours/week Credits: 3-0-0	Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hours
Course Objectives	It aims at enabling the student to understand the various components of environment in and around the earth crust and understand the effects of it over plants, animals, etc. Understand the important concepts of good rural water supply system to a city/town or a village. To understand the need of conservation of rainwater and its applications. To understand the sources, effects, prevention, and control measures of water pollution. Various approaches for planning of water supply systems in rural areas.
Unit-I	Introduction: Need for a protected water supply, investigation and selection of water sources, water borne diseases, protection of well waters, drinking water quality standards. (06 Hours)
Unit-II	Types of pumps, supply systems viz., BWS MWS, PWS, water treatment methods – disinfection, defluoridation, hardness and iron removal, ground water contamination and control. Concept of environmental and scope of sanitation in rural areas. (06 Hours)
Unit-III	Various approaches for planning of water supply systems in rural areas. Selection and development of preferred sources of water, springs, wells and infiltration galleries, collection of raw water from surface source. (06 Hours)
Unit-IV	Specific problem in rural water supply and treatment e.g., iron, manganese, fluorides etc. Low-cost treatment. Improvised method and compact system of treatment of surface and ground waters such as MB settlers, slow sand filter, chlorine diffusion cartridge etc. Water supply through spot sources, hand pumps, open dug –well. (06 Hours)
Unit-V	Planning of distribution system in rural areas. Water supply during fairs, festivals, and emergencies. Treatment and disposal of wastewater/sewage. Various method of collection and disposal of night soil. (06 Hours)
Unit-VI	On site sanitation system and community latrines. Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits etc. House fly and mosquito – life cycle, diseases, transmission, and control measures. (06 Hours)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1.	Water Supply for Rural areas and small communities	Wagher, E.G. and Lanoik, J.N.	Geneva: W.H.O.1959..	1 st edition
2.	Manual of water supply and treatment	CPHEEO	GOI, New Delhi.	3rd edition

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. final year (Civil Engineering) Semester - VII	
Course Code: CED422 Course: Earthquake Engineering Teaching scheme: Theory: 03 Hours/week Credits: 3-0-0	Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hours
Prerequisite	Design of Reinforced Concrete Structure, Design of Steel Structure.
Course Objectives	To understand the Basic concept of Earthquake Engineering. To make students familiar with the structural behavior of civil engineering structure (building) during earthquake
Unit-I	Elements of seismology – Terminology, structure of earth, causes of an earthquake, plate tectonic theory, continental drift theory, elastic rebound theory, seismic waves, magnitude and intensity, methods of measurement, seismic zoning of India, seismic coefficients for different zones, seismograph, strong motion earthquakes, accelogram. Lessons from past earthquake: - Study of damages caused due to past, earthquakes in India and remedial measures. (06 Hours)
Unit-II	Vibrations: Definition, Causes, Classification, Single Degree of Freedom Systems (SDOF) - Free, Forced, Damped, Un-Damped Vibrations. Introduction To Multi-Degrees of Freedom Systems (MDOF), Concept of Response Spectrum. (06 Hours)
Unit-III	Equivalent static lateral earthquake force, study of IS 1893,2002 (06 Hours)
Unit-IV	Building forms for earthquake resistance. Seismic effects and liquefaction. (06 Hours)
Unit-V	Earthquake Resistance Design Principles: Design philosophy, Behavior of RC building, ductility and ductile detailing, Design and detailing of beam and columns using IS 13920. (06 Hours)
Unit-VI	Seismic design of Masonry buildings Study of IS 4326, IS 13827, IS 13828, IS 13920. (06 Hours)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1	Dynamics of Structures-Theory and Applications to Earthquake Engineering	A.K. Chopra	Prentice Hall Publications.	Third edition
2	Earthquake Resistance Design of Structure	S. K. Duggal	Oxford University	Third edition.
3	Elements of Earthquake Engineering	Jai Krishna	South Asian Pub. New Delhi	Third edition

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. final year (Civil Engineering) Semester - VII	
Course Code: CED423 Course: Advance Geotechnical Engineering Teaching Scheme: Theory: 03 Hours/week Credits: 3-0-0	Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 03 Hours
Course Objectives	The first course in soil mechanics generally introduces the fundamental concepts, principles to the undergraduate students of civil engineering. This course "Advanced Geotechnical Engineering" goes deeper into the various aspects of soil mechanics along with bringing out the advanced theories and practical knowledge of geotechnical engineering.
Unit-I	Soil composition and soil structure: Soil formation; Types of soils and their characteristics; Particle sizes and shapes; their impact on engineering properties; Soil structure; Clay mineralogy; Soil-air-water interaction; Consistency; Soil compaction Concept. (6 Hours)
Unit-II	Permeability and Seepage: Permeability; Seepage force and effective stress during seepage. Laplace equations of fluid flow for 1-D, 2-D and 3D seepage, Flow nets, Anisotropic and non-homogeneous medium, Confined and Unconfined seepage. (6 Hours)
Unit-III	Stress-strain relationship and Shear strength of soils: Stress state, Mohr's circle analysis and Pole, Principal stress space, Stress paths in p-q space; Mohr-coulomb failure criteria and its limitations; correlation with p-q space; Stress-strain behavior: Isotropic compression and pressure dependency, confined compression, large stress compression, Definition of failure, Interlocking concept and its interpretations, Drainage conditions; Triaxial behavior, stress state and analysis of UC, UU, CU, CD, and other special tests, Stress paths in triaxial and octahedral plane; Elastic modulus from triaxial tests. (6 Hours)
Unit-IV	Stability of Slopes: Stability analysis of a slope and finding critical slip surface; Sudden Draw down condition, effective stress and total stress analysis; Seismic displacements in marginally stable slopes; Reliability based design of slopes, Methods for enhancing stability of unstable slopes. (6 Hours)
Unit-V	Buried Structures: Load on Pipes, Marston's load theory for rigid and flexible pipes, Trench and Projection conditions, minimum cover, Pipe floatation and Liquefaction. (6 Hours)
Unit-VI	Geotechnical Physical Modeling: Physical modeling methods; Application of centrifuge modeling and its relevance to geotechnical engineering; Centrifuge modeling of geotechnical structures. (6 Hours)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1.	Advanced Soil Mechanics.	Taylor and Francis Group, London,	Das, B.M. (2008).	Second edition
2.	Soil Mechanics in Engineering Practice.	Terzaghi, K.	Peck, R.B. and Mesri, G. (1996).	Second edition
3.	Geotechnical Modeling.	Wood, D.W. (2004).	Spon Press, Taylor and Francis Group, London,	First edition.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of Final Year B. Tech. (Agricultural Engineering) Semester VII	
Course Code: AED431 Course: Open Elective-III Ecology and Environmental Pollution Teaching Scheme: Theory: 03 Hours/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 3 Hours
Prerequisite	Concept of ecology and types of pollution
Objectives	1. To impart knowledge of ecological applications 2. To impart knowledge of environment and different types of pollution 3. To impart knowledge of pollution analysis and instrumentation
Unit-I	Principles of Ecology: Definition Principles and Scope of Ecology – Energy Flows, Ecological Pyramids, Types and Diversity, Food Chains and Food Webs. Homeostasis – Theories of Limiting Factors Ecological Succession – Population and Communities- Reproductive Strategies- r and k Factors. Community Ecology- Structure, Species Diversity and Species Interaction. (4 Hrs.)
Unit-II	Ecosystem Ecology: Ecosystem- Structure- Components (Abiotic and biotic) and Functions of an Ecosystem. Ecosystem Types and Diversity- Terrestrial and Aquatic (Fresh water and Marine) Ecosystems. Ecotones - Concept of Edge Effect, Ecological Niche- Classification Biomes - General Relationships Landscapes and Biomes – Climatic factors - Bio-geographical Regions of the World and Modern Biogeography. (6 Hrs.)
Unit-III	Ecological Applications: Sustainable Development- Ecological Sustainability- Organic Farming, Bio fertilizers and Bio pesticides - Integrated Pest Management (IPM) - Biological Monitoring of the Environment- Indicator species - Ecosystem Development- Theory of Human Ecology, Ecology of Space Travel- Types of Life Supporting Systems- Exobiology. (6 Hrs.)
Unit-IV	Atmosphere Structure of Atmosphere: Temperature Profile – Influence of Meteorological factors on Air Pollution – Air Pollutants: Oxides of Sulphur – Oxides of Nitrogen – Carbon monoxide – Particulate matter, Dispersion, and impacts – Photochemical smog – Greenhouse effect – Ozone depletion – Acid Rains – Sources of noise pollution, measurement of noise and standards – impacts of Air Pollution on human health and structures. (6 Hrs.)
Unit-V	Hydrosphere and Lithosphere Classification of water and Water bodies – Abnormal properties of water – Water cycle Water Quality Parameters – Water Pollution – Sources – Classification, nature, and Toxicology of water pollutants: Trace metals – Lead – Mercury – Zinc – Cadmium – Organic substances - Pesticides – Oil surfactants – Nutrients – Phosphates – Nitrates – Eutrophication – Ground water pollution – Ocean Pollution by toxic wastes – Ecological and Economic impacts of water pollution. Soil: Texture – Composition and distribution – Land use

	Classification and Patterns – Impacts of land use on soil ecology – Ecological and Economic impacts of soil erosion and soil pollution. (8 Hrs.)
Unit-VI	Pollution Analysis and Instrumentation: Principles of Sampling of Air, Water and Soil: Samplers and Sampling Techniques – Analysis of Pollutants: Titrimetric – Gravimetry – Spectrophotometry – Chromatography and Flame techniques. Instrumentation: Instruments for specific parameters – Principles and Applications of UV – VIS Spectrophotometer – Flame Photometer – Atomic Absorption Spectrophotometer – Gas Chromatography – GLC – HPLC – Instrumentation for Weather monitoring (6 Hrs.)
Reference Books:	1. Turk J and Turk A. 1984 Environmental Sciences 3rd Edn. Saunders College Publications. Seed Processing by Gregg, NSC 2. Odum E. P. 1971 Fundamentals of Ecology 3rd Edn. W. B. Saunders Company London 3. Laurent Hodges – Environmental Pollution 4. C.S. Rao – Environmental Science and Engineering

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of Final Year B. Tech. (Civil Engineering) Semester VII	
Course Code: CED 431 Course: Open Elective –III Town Planning Teaching Scheme: Theory: 3 Hours/week Credits: 3-0-0	Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 3 Hrs
Prerequisite	Basic of Urban Planning and Development
Objectives	1. The course is intended to provide the students an overview and understanding of Town Planning. 2. To study history & ancient planning in India. 3. To study origin and growth of towns.
Unit-I	Introduction: Necessity and scope of Town planning, Brief History Greek and Roman Town, Planning in Ancient India, Indus valley Civilization Vedic and Harappan period. Principles of Town Planning, Development of Towns, Elements of towns. (06 Hrs)
Unit-II	Levels of planning process: Town planning survey, Data collection and analysis, Growth Pattern, Development plan, Master Plan, Regional Plan, Zoning. (06 Hrs)
Unit-III	Housing: Importance of housing, Demand for houses, Requirements, Rural Housing, Village Planning, Low-cost Housing, Agencies for Housing, Functions of CIDCO, HUDCO, MHADA, HDFC, Housing problems in India. (06 Hrs)
Unit-IV	Town Planning Scheme: Concept, Preparation of town planning scheme, Relation with Development plan, Original Plot, Final plot, Semi Final Plot, Local Area Plan-Concept, objective, methods of Preparation, Case studies in India, Re-planning of Existing Towns. (06 Hrs)
Unit-V	History of Architecture: Principle, Types of Architecture (Greek, Egyptian Roman styles), Building Byelaws: Objective, Principles, Aspect, Prospect, Importance. (06 Hrs)
Unit-VI	Acts: Land Acquisition Act, Necessity, and procedure of Acquisition, MRTP Act, RTI and RTS Act, URDPFI. Urban Road Development: Objectives Requirements, Classification, Types. (06 Hrs)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1.	Town Planning	Rangwala	Charotar	21 st Edition
2	Fundamentals of Town Planning	G. K. Hirasakar	Dhanpat Rai Publication	2 nd Edition
3	Textbook of Town Planning	G.K. Bandopadhyaya	Charotar	2 nd Edition

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. (Computer Science and Engineering) Semester VII	
Course Code: CSE 431 Course: Open Elective -III- Big Data Analytics Teaching Scheme: Theory: 03 hours/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 3 Hours
Prerequisite	Knowledge of Programming Language (Java preferably), SQL
Objectives	1. To understand the Big Data Platform and its Use cases 2. To understand the basics of Apache Hadoop and HDFS 3. To apply analytics on Structured, Unstructured Data
Unit-I	FUNDAMENTALS OF BIG DATA The Evolution of Data Management, Understanding the Waves of Managing Data, Defining Big Data, Four Vs, Big Data Management Architecture. Big Data Types: Defining Structured Data, Defining Unstructured Data, Big Data Applications. (6 Hrs)
Unit-II	BIG DATA TECHNOLOGY LANDSCAPE Big Data Technology Components: Exploring the Big Data Stack, Virtualization, Understanding the Basics of Virtualization, Managing Virtualization with the Hypervisor, Abstraction and Virtualization, Implementing Virtualization to Work with Big Data. (6 Hrs)
Unit-III	DATA ANALYTICS Predictive Analytics: Linear Regression, Logistic Regression, Decision Trees, Descriptive Analytics: Association Rules, Sequence Rules, Segmentation, Social Network Analytics: Social Network Definitions, Social Network Metrics, Social Network Learning, Relational Neighbor Classifier, Business Process Analytics. (6 Hrs)
Unit-IV	HADOOP AND MAP REDUCE History of Hadoop, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, Hadoop Storage, Common Hadoop Shell commands, Hadoop Architecture, Hadoop MapReduce Paradigm: Map and Reduce tasks, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats. (6 Hrs)
Unit-V	HDFS (Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Sqoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro, and File-Based Data structures. (6 Hrs)
Unit-VI	HADOOP ECHO SYATEM Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt Pig Latin, User Defined Functions, Data Processing operators. Hive: Hive Shell , Hive Services, Hive Metastore, Comparison with Traditional Databases HiveQL, Tables, Querying Data and User Defined Functions. HBase: HBasics , Concepts, Clients, Example, HBase Versus RDBMS. (6 Hrs)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1.	Big Data Analytics	Seema Acharya, Subhasini Chellappan	Wiley	Second
2.	Hadoop: The Definitive Guide	Tom White	O'reily Media	Third
3.	Analytics in a Big Data World: The Essential Guide to Data Science and its Applications	Bart Baesens	Wiley	-



REFERENCES:

Sr. No.	Title	Author	Publication
1	Battery management systems	Plett, Gregory L	Volume I: Battery modeling. Artech House, 2015
2	Battery management systems	Plett, Gregory L	Volume II: Battery modeling. Artech House, 2015
3	Battery Management Systems - Design by Modelling	Bergveld, H.J., Kruijt, W.S., Notten, P.H.L	Philips Research Book Series 2002
4	Battery Management Systems for Large Lithium-ion Battery Packs	Davide Andrea	Artech House, 2010
5	Battery management systems: Accurate state-of-charge indication for battery-powered applications	Pop, Valer, et al.	Vol. 9. Springer Science & Business Media, 2008.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of Final year B. Tech (Electronics and Telecommunication Engineering) Semester-VII	
Course Code: ETC431 Course: Open Elective-III Data Science Teaching Scheme: Theory: 3 Hrs./week Credits: 3-0-0	Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 3 Hrs.
Prerequisite	Programming Concepts, Data Structure, Basic Linear Algebra, Basic Probability and Statistics.
Objectives	1. Introduce data science and its applications. 2. Understand use of statistics in data science 3. Use data science to analyse large and unstructured data with different tools.
Unit-I	Introduction: Introduction, Terminologies in data science, Applications of Data science, Data science and Development, datafication, current landscape of perspective. Role of Data science in AI and ML. (6 Hrs)
Unit-II	Statistical Inference and Exploratory data analysis: Statistical modelling, probability distributions, fitting a model, Populations and samples, Basic Tools (Plots, Graphs, and summary statistics) of EDA, philosophy of EDA, the data science process, Case Study. Introduction to R. (6 Hrs)
Unit-III	Machine Learning Algorithm and its Usage: Linear Regression, k-nearest Neighbours(k-NN), k-means. Spam filtering, naïve Bayes and its application for spam filtering, Data Wrangling: Tools and API for scrapping the web. (6 Hrs)
Unit-IV	Feature Generation and Selection: Feature generations algorithms, feature selection algorithms: filters, wrappers, decision trees, random forest. Algorithmic ingredients of a recommendation engine, dimensionality reduction, singular value decomposition, principal component analysis. (6 Hrs)
Unit-V	Mining Social Network: Social Networks as graphs, clustering of graphs, direct discoveries of communities in graphs, portioning of graphs, neighbourhood properties of graphs. Illustration with an example. (6 Hrs)
Unit-VI	Data visualization and ethical issues: Basic principles, ideas and tools for data visualization, creation of visualization for complex data set. Aesthetics in data visualization, software's used for data visualization, Case study. Privacy, security, and ethics of data science. (6 Hrs)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1	Doing Data Science: Straight Talk from The Frontline	Cathy O'Neil and Rachel Schutt	O'Reilly Media, Inc	III
2	Mining of Massive Datasets. v2.1	Jure Leskovek, Anand Rajaraman and Jeffrey Ullman	Cambridge University Press	I
3	Learning: A Probabilistic Perspective	Kevin P. Murphy	MIT Press	II
4	Data Science for Business:What You Need to Know about Data Mining and Data-analytic Thinking.	Foster Provost and Tom Fawcett	O'Reilly Media, Inc	I

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of Final year B. Tech (Mechanical Engineering) Semester-VII	
Course Code: MED431 Course: Open Elective-III: Modern Management Technique Teaching Scheme: Theory: 3 Hrs./week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 3 Hrs.
Prerequisites	: 1.Knowledge of basic concepts of manufacturing processes
Objectives	: 1) To understand the concepts of modern management to enhance creativity 2)To understand the significance of TPM & SCM
Unit-I	: Value Engineering: Value-types, Value analysis, Value Engineering, Value Control, FAST analysis DARSARI method (06Hrs)
Unit-II	: Supply Chain Management: Introduction, Decision Phases in Supply Chain, Process view of a supply chain importance of supply Chain Flows. New Customer –Supplier relationship –Supplier selection, purchasing, JIT in Supply Chain, E-Business, and the Supplier Chain. (06Hrs)
Unit-III	: Methods Engineering: Continuous method improvement, waste, type of waste elimination. KAIZEN Improvement versus Innovation, Finding & Implementing improvements-PDCA cycle, Five -Why Process. Process Reengineering. Ensuring Correct method of working POKAYOKE. Workplace layout & workstation design, single minute exchange of dies, material handling system. (06 Hrs)
Unit-IV	: Lean Manufacturing: Introduction Definition, distinctive features, mall-Lot Production, setup- time Reduction, Maintaining and Improving Equipment. Pull production system. Focused factories and group technology, work cells and Cellular. Manufacturing Standard Operation. (06 Hrs)
Unit-V	: Total Productive Maintenance: Introduction, Definition, Distinctive features, four developments striving for overall equipment effectiveness, the five TPM development activities the twelve steps of TPM, stages of TPM development. (06 Hrs)
Unit-VI	: Management Information System Data, Information, needs of computer-based introduction system Definition & concept of MIS and Data processing, need of database, Role of MIS in organization Impact of MIS on function of organization. (06 Hrs)

REFERENCES:

Sr. No.	Title	Author	Publication
1	Industrial Engineering & Production Management	Maratand Telsang	S.Chand
2	Techniques of Value Analysis & Engineering	I.D. Miles	-
3	Kaizen	Masaaki Imai	-
4	Pokayoke	Hiroyuki Hirmaao	Productivity Press,Cembridge
5	Management Information System	W.S. Jawadekar	TMH
6	Supply Chain Management	Sunil Chopra,Peter Meindl	Pearson Education
7	Competitive Manufacturing management	John M.Nicholas	TMH
8	Management Information System, Conceptual foundation, Structure & Development	Garden Bdevis & Margrath H.Olson.MGH	-
9	Industrial Engineering & Production & Operations Management	Sanjay S.Patil Nanadkumar Hukeri	Electrotech Publications
10	1. https://onlinecourses.nptel.ac.in/noc21_ge20/preview 2. https://onlinecourses.nptel.ac.in/noc22_cs97/preview 3. https://onlinecourses.nptel.ac.in/noc22_cs89/preview 4. https://onlinecourses.nptel.ac.in/noc22_cs73/preview		

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of Final Year. B. Tech. (Plastic and Polymer Engineering) Semester-VII	
Course Code: PPE431 Course: Open Elective-III (Packaging Technology) Teaching Scheme: Theory: 3 Hrs/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks End Semester Examination: 60 Marks End Semester Examination (Duration): 3 Hrs
Prerequisite	Basic knowledge of Packaging materials, Processing and Testing.
Objectives	To impart knowledge and skills related to packaging system for various products, to understand the concepts of materials used in packaging, machinery in packaging and testing of packaging material.
Unit-I	Introduction: Packaging: History, Need & Evolution, Elements, Approach, Functions of packaging, Applications. Elements of Package Design, Importance of a good design, Packaging Hazards, and their control. (6Hr)
Unit-II	Packaging Materials: Selection criteria, Properties and Applications of plastic, paper, metal, wood and glass packaging materials, Biodegradable material. (6Hr)
Unit-III	Packaging forms: Bottle, Skin, Blister, Shrink, Carton, Vacuum, Gas, CAP, MAP, Tubes, Corrugated containers etc. (6Hr)
Unit-IV	Specialty packages: Aseptic, Tetra, Types of pouches/sack; Stand up pouch, Retort pouch, gusseted pouch, Flexible Packaging. (6Hr)
Unit-V	Food and agro based Packaging: Requirements and their selection for raw and processed foods, Meat, Fish, Poultry, Eggs, Milk and Dairy products, Fruits and vegetables, Cereal grains and Baked food products, Beverages, Snacks, Ready to eat food, Packaging of Horticultural crops. Packaging of drugs and cosmetics. (6 Hr)
Unit-VI	Printing: Surface treatment, Printing processes, Printing inks. Packaging quality control: Criteria, Physical, Chemical, Mechanical test Procedure for packaging materials & packaged products. (6 Hr)

REFERENCES:

Sr. No.	Title	Author	Publication	Edition
1	Fundamentals of Packaging Technology	Soroka W.	IoPP	3 rd Edition, 2002
2	Understanding Plastic Packaging Technology	Susan E.M. Seleke	Hanser publications - Munich	1st Edition, 1997.
3	Plastics in Packaging	A.S. Althalye	Tata McGrawHill publishing Co. Ltd., New Delhi.	1st Edition, 1992.
4	Food Packaging Technology Handbook	NIIR	Asia-Pacific publication.	1st Edition, 2012.
5	Package Engineering	Honlon J F	McGraw Hill	1st Edition, 1984.
6	Plastics Packaging	Turtle Ivor	Pira International	1st Edition, 1990.
7	Handbook of Packaging-Plastics	A.S. Althalye	Multi-tech Plastics publishing co. Mumbai.	1st Edition, 2013.
8	The Wiley Encyclopedia of Packaging Technology	Kit L Yam	John Wiley & Sons Inc. Publication	2009.
9	The Packaging User's Handbook	F.A. Paine	Blackie Academic & Professional.	1st Edition, 1999

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. final year (Civil Engineering) Semester - VII	
Course Code: CED411	Credits: 01
Course: (Lab) Estimating and Costing	Teaching Scheme:
Term Work: 25 Marks	Practical: 02 Hours/week
PRACTICAL – (Any 10) 1 : Preliminary estimate using Plinth area method. 2 : Detailed estimate of Load bearing structure 3 : Detailed estimate of Frame structure. 4 : Calculation of steel with Bar bending Schedule. 5 : Detailed estimate of earthwork of road for Approximate 1km length. 6 : Draft Detailed specification for 8 major items. 7 : Analysis the unit rate of 8 major items of work contained. 8 : Draft a short tender notice for proposed work. 9 : Calculation of annual and total Depreciation and book value of the end of each year. 10 : Fixation of standard rent of property. 11 : Market survey for material and labour rates for various items. 12 : Detailed planning and estimate of plumbing work. 13 : Detailed estimate of building using estimate software.	
The assessment of term work shall be done based on 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 B. Tech. final year (Civil Engineering) Semester - VII																																	
Course Code: CED412 Course: (Lab) Highway Engineering Term Work: 25 Marks	Credits: 01 Teaching Scheme: Practical: 02 Hours/week																																
List of Practical: (Any 10) <table> <tr> <th>Sr. No.</th><th>Name of Practical</th></tr> <tr><td>1</td><td>: Aggregate Impact Test.</td></tr> <tr><td>2</td><td>: Aggregate Crushing Test.</td></tr> <tr><td>3</td><td>: Los Angeles Abrasion Test.</td></tr> <tr><td>4</td><td>: Shape & Size Test: Flakiness Index & Elongation Index.</td></tr> <tr><td>5</td><td>: Specific Gravity & Water Absorption.</td></tr> <tr><td>6</td><td>: Soundness Test on Aggregates.</td></tr> <tr><td>7</td><td>: Penetration Test.</td></tr> <tr><td>8</td><td>: Softening Point.</td></tr> <tr><td>9</td><td>: Ductility Test.</td></tr> <tr><td>10</td><td>: Viscosity Test.</td></tr> <tr><td>11</td><td>: Flash & Fire Point Test.</td></tr> <tr><td>12</td><td>: Marshal Stability Test.</td></tr> <tr><td>13</td><td>: California Bearing Ratio Test.</td></tr> <tr><td>14</td><td>: Mixed Traffic Volume Study. (Fast and Slow vehicles)</td></tr> <tr><td>15</td><td>: Traffic Speed Study.</td></tr> </table>		Sr. No.	Name of Practical	1	: Aggregate Impact Test.	2	: Aggregate Crushing Test.	3	: Los Angeles Abrasion Test.	4	: Shape & Size Test: Flakiness Index & Elongation Index.	5	: Specific Gravity & Water Absorption.	6	: Soundness Test on Aggregates.	7	: Penetration Test.	8	: Softening Point.	9	: Ductility Test.	10	: Viscosity Test.	11	: Flash & Fire Point Test.	12	: Marshal Stability Test.	13	: California Bearing Ratio Test.	14	: Mixed Traffic Volume Study. (Fast and Slow vehicles)	15	: Traffic Speed Study.
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Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of B. Tech. final year (Civil Engineering) Semester - VII	
Course Code: CED413 Course: (Lab) Construction Management Term Work: 50 Marks	Credits: 01 Teaching Scheme: Practical: 02 Hours/week
PRACTICAL: 1. Theories of Management 2. Functions of management 3. Time Management (Bar chart, network, float, crashing, PERT) 4. Financial Management 5. Inventory Control- Necessity, Techniques such as ABC, EOQ. 6. Laws related to construction industry 7. One assignment in MSP / PRIMAVERA / Any construction Management software. 8. PPEs used in construction industries. 9. Visit to Project Site	
The assessment of term work shall be done based on 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 Final Year B. Tech. (Civil Engineering) Semester-VII	
Course Code: CED450 Course: Major Project - II Practical Examination: 50 Marks	Credits: 02 Teaching Scheme: Practical: 04 Hours/week
Prerequisite	1. Writing Skill 2. Presentation skill 3. Knowledge of data base management 4. Application of theory in real life problems.
Objectives	The practical implementation of theoretical knowledge gained during the study to till date is important for engineering education. The student should be able implement their ideas/real time industrial problem/ current application of their engineering branch which they have studied in curriculum. • To motivate students for creativity. • To create awareness regarding latest technology • To have common platform for interaction about emerging technology. • To inculcate qualities of teamwork. • To explore related information using books, research papers, journals & websites. • To improve presentation and communication skills.
Contents:	
• The completion of project is to be carried out in two semesters i.e., in Third Year 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 interdisciplinary projects of their choice. • The student's 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 Major Project - II:

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

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

Phase III: Submission of report of project work.

The assessment of term work shall be done based on the following:

- Continuous Assessment.
- Performing the experiments in the Laboratory.

Oral Examination conducted on the syllabus and term-work mentioned above.

FACULTY OF SCIENCE AND TECHNOLOGY
Syllabus Structure w.e.f. 2022-2023 (Choice Based Credit System)

Final Year B. Tech. (Civil Engineering)

Semester-VII

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks							Credits			
		Theory	Practical	Tutorial	MSE-I	MSE-II	TA	ESE	TW	PR/OR	Total	TH	TW/PR	TUT	Total
CED 401	Estimating and Costing	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED 402	Highway Engineering	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED 403	Construction Management	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED 421 to 423	Professional Elective Courses-IV	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED481	Open Elective-III: Town Planning	3	-	-	15	15	10	60	-	-	100	3	-	-	3
CED 411	Lab 1: Estimating and Costing	-	2	-	-	-	-	-	-	25	25	-	1	-	1
CED 412	Lab 2: Highway Engineering	-	2	-	-	-	-	-	-	25	25	-	1	-	1
CED 413	Lab-3: Construction Management	-	2	-	-	-	-	-	50	-	50	-	1	-	1
CED 414	Major Project-II	-	8	-	-	-	-	-	50	50	100	-	4	-	4
		15	14	-	75	75	50	300	100	100	700	15	7	-	22

Semester-VIII

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks							Credits			
		Theory	Practical	Tutorial	MSE-I	MSE-II	TA	ESE	TW	PR/OR	Total	TH	TW/PR	TUT	Total
CED 451	Internship	-	-	-	-	-	-	-	300	300	600	-	20	-	20

MSE- Mid Semester Exam, ESE- End Semester Examination, TH-Theory, OR- Oral, TA-Teacher Assessment, TW- Term Work, PR- Practical, Tut- Tutorial

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of Final Year B. Tech. (ALL) Semester-VIII	
Course Code: CED451 Course: Internship Teaching Scheme: Practical Examination Duration: 02 Hours	Credits: 20 Practical Examination: 300 Marks Term Work: 300 Marks
Prerequisite	Student must complete all previous semester courses.
Objectives	1. The students of B. Tech course shall get an opportunity to work on live problems of the industry. 2. He/ She shall apply learning concepts in the real work situation. 3. He/ She shall get an exposure to the industrial environment and thereby enable himself/herself to appreciate the other related aspects of industry viz. human, economic, commercial, and regulatory. 4. He/ She shall identify career paths considering their individual strengths and aptitude. 5. He/ She shall contribute for the achievement of economic goals and aspirations of the industry and our country.
Provisions and Rules:	
General Provisions, Rules, and Regulation of In-Plant Training:	
1. Definition: • In-plant training means a course of training in any industry or establishment undergone in pursuance of memorandum of understanding between industry and institute and under the prescribed terms and conditions of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. • Institution means an academic Institution of higher learning associated and admitted under the privileges of university, i.e., Maharashtra Institute of Technology, affiliated to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. • Industry means any industry or business in which any trade, occupation or subject field in engineering or technology may be specified as a designated trade. • Establishment includes any place where any industry is carried on. • University means any of the universities mentioned in the schedule of Maharashtra (University Act, 1994 i.e., Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.) • Collaboration means collaborative academic activity of the Institute with industry. • Student means a B Tech Course student.	
2. Memorandum of understanding: • Maharashtra Institute of Technology, Aurangabad will enter into an agreement with the industry through 'Memorandum of Understanding' for creating facilities of in-plant training in the appropriate branch of Engineering according to the Course Curriculum	

and keep this agreement for a period of 10 years to foster a healthy industry- institute interaction for mutual benefits of both.

3. Admission to in-plant training:

- No student will be deputed for in-plant training unless he produces testimonial of having kept one term for the subject under B Tech Semester –VIII of final year course satisfactorily in Maharashtra Institute of Technology after passing the TY B Tech Examination (in the appropriate branch).

4. Period of in-plant training:

- The period of in-plant training will be the period of one term for the subject under B. Tech course semester-VIII, which will be notified by Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

5. Contract of In-plant Training:

- The student at Maharashtra Institute of Technology shall enter a contract of in plant training with the employing industry.
- The in-plant training shall be deemed to have commenced on the date, on which the contract of In-plant training has been entered.
- Every contract of in-plant training will contain the Terms and Conditions to be agreed by both the parties.
- Every contract of in-plant training shall be registered with the Maharashtra Institute of Technology within 15 days from entering the contract.

6. Violation of contract:

- Where an employer, with whom a contract for in-plant training has been entered, is for any reason, unable to fulfil his obligation under the contract, the contract ends with the consent of Maharashtra Institute of Technology.
- It is agreed between the employer, the student, and any other employer that the student shall be engaged as an “in-plant trainee” under the other employer till the expiry period of the in-plant training.
- The agreement on registration with Maharashtra Institute of Technology shall be deemed to be the contract of in-plant training between the student and other employer, and from the date of such registration, the contract of in-plant training with the first employer shall terminate and no obligation under that contract shall be enforceable at the instance of any party to contract against the other party thereto.

7. Termination of Contract:

- The contract of in-plant training shall terminate on the expiry of the period of in-plant training. Party to the contract of in-plant training make an application to Maharashtra Institute of Technology, Aurangabad for the termination of the contract.
- After considering the content of the application, and objection, Maharashtra Institute of Technology by order in writing, will terminate the contract, if it is satisfied that the

parties to the contract have/has failed to carry out the Terms and Conditions of the contract. Provided that where a contract is terminated.

- For the failure on the part of the Employer, Maharashtra Institute of Technology will depute students to another Employer for providing facilities of in-plant training to the remaining period of training.
- For the failure on the part of the student, the student will not be allowed to continue his/her in-plant training in that term. The student shall be deputed for in-plant training in the next coming term.

8. Expectation from the Employer/Industry:

The following expectations are derived for effective in-plant training.

- To provide legitimate facilities for the training and learning of all the processes.
- To guide the student for understanding a project of immense importance to industry and to help him/her for his/her career advancement.

9. Obligation of Students:

- To learn his/her subject field in Engineering or Technology conscientiously and diligently at his place of training.
- To carry out all orders of his Employer and the Superior in the establishment.
- To abide by the Rules and Regulations of the Industry/Establishment in all matters of conduct and discipline.
- To carry out the obligation under the contract of in-plant training.
- The student shall maintain a report of his work during the period of his in-plant training in a proforma Annexure.
- Except in case of extreme urgency, the B. Tech student shall apply for all other leaves except the medical leave to the Manager/ General Manager (Personnel) of the concerned industry, where he is undergoing in-plant training and obtain sanction before the leave is taken.
- In case of Medical Leave, he shall apply to Maharashtra Institute of Technology, Aurangabad.
- The shortage in attendance will be subjected to extending the period of in-plant training in which case, the student may not be allowed to appear for the test, project seminar and assessment of term work etc. which will be held immediately after successful completion of the in-plant training.

10. Maintenance of Record:

- Every student of B. Tech course shall maintain a daily record of the work done by him/her relating to the in-plant training in the proforma (Annexure).

11. Industry Sponsored Student Projects:

- The scheme envisages working out suitable programme for B. Tech students. They are required to complete their in-plant training in each period.

- During this period, they shall be familiar with the understanding of the shop process and activities. The students can be asked to solve the mini-shop problem, which will make them think and try out short experiments as an improvement in the process, tools, and equipment.
- The student here is not expected to acquire the skills in operating machines values. He should appreciate the application of theory learnt. The students in a group alone can undertake a project of immense importance for the benefit of the industry and useful for the students for their advancement of career.
- Industry staff and Maharashtra Institute of Technology faculty can plan to effectively complete the practical training with the project for preliminary studies on the floor.

The projects should aim mainly-

- Cost reduction
- Reducing cycle time
- Enhancing productivity
- Energy conservation measures
- Process Improvement technique
- Inventory control
- Quality control Technique
- Improvement in Material handling system
- Bottlenecks in material flow system and so on.

12. What will form a good project?

- Through the project, it is hoped to provide the students an exciting experience in solving line problems under practical constraints. Hence it is desired that the project should be a well-defined problem, which can be completed and implemented within the project period.
- It may be a problem, evolving analysis, design, and fabrication and/or testing.

13. Time Schedule for the Project:

The following time schedule should be planned by each student or groups of students, who undertake the project.

- Proposal to be received before specifies date.
- Project acceptance before.
- Commencement of the project.
- Completion of the project.

14. Commitment on the part of the Institute:

- Providing a faculty member to supervise the project.
- Providing the Institute facilities to complete the project.

- Coordinator from industry will be invited to participate in the stage wise assessment of the student's performance.

15. Assistance for completion of the Project:

- All the projects undertaken by the students are time bound. Although, every attempt result may not be achieved within the period available for the student. In such cases, the services of the associated faculty members can be sought for the completion of the same on mutually agreed terms.

16. Monitoring of In-Plant Training:

- B. Tech students are expected to follow all the rules and discipline of the industry.
- However, because of other academic requirements and the nature of the project, the student may have to work in other places outside the industry.
- The faculty and Industry supervisor will work out a suitable arrangement to review the progress of the work from time to time.
- Maharashtra Institute of Technology, Aurangabad will monitor the progress of in-plant training in association with industry authority.

17. Conduct and Discipline:

- In all matters of the conduct and discipline, B. Tech student shall be governed by the rules and regulations (applicable to employees of the corresponding category) in the Establishment, where he/she is undergoing training.

18. B. Tech Students are Trainees and not Workers:

- Every B. Tech student undergoing an in-plant training in the respective branch of Engineering & Technology in any Establishment shall be treated as a trainee and not a worker.
- The provision of any law with respect to labour will not apply to such a trainee.

19. Settlement of Disputes:

- Any disagreement or dispute between an industry and a B. Tech student trainee arising out of the contract of in-plant training shall be resolved both by Maharashtra Institute of Technology and the industry with cooperation. The decision of both Maharashtra Institute of Technology and the industry shall be final.

20. Holding of Test and Grant of Certificate:

- The progress in in-plant training of every student shall be assessed by the industry and Maharashtra Institute of Technology faculty from time to time. Every B. Tech student undergoing in-plant training shall be issued a certificate of Proficiency on completion of his training to the satisfaction of the industry.

21. Offer of Stipend / Other Welfare Activities and Employment:

- It shall not be obligatory on the part of the Employer / Industry to offer any stipend and other welfare amenities available, if any, to the students of B. Tech courses undergoing in-plant training. However, if the industry desirous to do so, it will be a privilege for the students and for Maharashtra Institute of Technology in view of the bonding of better understanding and cooperation forever.

PRACTICAL EXAMINATION:

- The Practical examination will be conducted after successful completion of the in-plant training for which guide will be internal examiner and external examiner will be appointed by the university. The date of practical examination will be same for the students of a branch and will be notified by the university.
- The assessment of the practical examination shall consist of
 1. Seminar Performance
 2. An oral on the project work done.
 3. Assessment of the term work.

Note: A 'Guide Note' on In-Plant training approved by the University is prepared and made available in each faculty of B. Tech course.