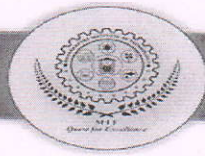




MAHARASHTRA INSTITUTE OF TECHNOLOGY, AURANGABAD

**An Autonomous Institute Affiliated to Dr.
Babasaheb Ambedkar Marathwada University,
Aurangabad, Maharashtra (India)**

**Second Year B.Tech. Syllabus
(Civil Engineering) 2022-23**



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S. Y. B. Tech. Syllabus Structure w.e.f. 2022-23 (Pattern 2021-22)														
Civil Engineering														
Semester - III														
Sr. No	Course Category	Course Code	Course Title	L	T	P	Contact Hr/Wk	Credits	MSE-I	MSE-II	CIE	TA	ESE/Oral	Total
Orientation Program (2 Days)														
1.1	BSC	BSC204	Linear Algebra & Transform	3	1	-	4	4	15	15	10	10	50	100
1.2	PCC	CED201	Strength of Materials	3	-	-	3	3	15	15	10	10	50	100
1.3	PCC	CED202	Surveying and levelling	3	-	-	3	3	15	15	10	10	50	100
1.4	PCC	CED203	Building Planning & Design	3	-	-	3	3	15	15	10	10	50	100
1.5	PCC	CED204	Concrete Technology	3	-	-	3	3	15	15	10	10	50	100
1.6	PCC	CED221	Lab-I: Strength of Materials	-	-	2	2	1	-	-	-	-	25	25
1.7	PCC	CED222	Lab-II: Surveying and Levelling	-	-	2	2	1	-	-	-	-	25	25
1.8	PCC	CED223	Lab-III: Building Planning & Design	-	-	2	2	1	-	-	-	25	25	50
1.9	PCC	CED224	Lab-IV: Concrete Technology	-	-	2	2	1	-	-	-	25	-	25
1.10	PCC	CED225	Lab-V: Software programming (Data Analytics)	-	-	2	2	1	-	-	-	25	-	25
1.11	HSM	HSM 804	Mandatory Non-Credit Course	2	-	-	2	-	Mandatory Non-credit course					
				17	1	10	28	21	75	75	50	125	325	650
Semester - IV														
Sr. No	Course Category	Course Code	Course Title	L	T	P	Contact Hr/Wk	Credits	MSE-I	MSE-II	CIE	TA	ESE/Oral	Total
2.1	BSC	BSC251 B	Complex variable & Vector Calculus	3	1	-	4	4	15	15	10	10	50	100
2.2	PCC	CED252	Fluid Mechanics	3	-	-	3	3	15	15	10	10	50	100
2.3	PCC	CED253	Theory of Structures	3	-	-	3	3	15	15	10	10	50	100
2.4	PCC	CED254	Engineering Geology	3	-	-	3	3	15	15	10	10	50	100
2.5	PEC	CED231-CED233	Professional Elective Courses-I	3	-	-	3	3	15	15	10	10	50	100
2.6	PCC	CED271	Lab-I: Fluid Mechanics	-	-	2	2	1	-	-	-	-	25	25
2.7	PCC	CED272	Lab-II: Theory of Structures	-	-	2	2	1	-	-	-	25	-	25
2.8	PCC	CED273	Lab-III: Engineering Geology	-	-	2	2	1	-	-	-	-	25	25
2.9	HSM	BSC 254	Lab-IV: Development of Skills	-	-	2	2	1	-	-	-	25	25	50
2.10	PCC	CED278	Lab-V: Problem-Based learning	-	-	2	2	1	-	-	-	25	-	25
2.11	HSM	HSM805-807	Mandatory Non-Credit Course	2	-	-	2	-	Mandatory Non-credit course					
				17	1	10	28	21	75	75	50	125	325	650

L - Lecture, T - Tutorial, P - Practical, MSE - Mid Semester Examination, CIE - Continuous Internal Evaluation, TA - Teacher Assessment, ESE - End Semester Examination

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Syllabus of Second Year B.Tech. 2022-23

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Academics
Maharashtra Institute of Technology
Aurangabad.

[Signature]
Director
Maharashtra Institute of Technology,
Aurangabad.



Semester-III

HSM804

Mandatory Non-Credit Course

Constitution of India

Semester-IV

HSM805

Mandatory Non-Credit Course

Professional Ethics and Corporate Social Responsibility

HSM806

Emotional Intelligence

HSM807

Stress Management Through Yoga

Semester-IV

CED231

Professional Elective-I

Environmental Pollution & Control

CED232

Advance Surveying

CED233

Railway and Airport

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Course Code: BSC204 Course: Linear Algebra & Transform Teaching Scheme: Theory: 03 Hrs/week Tutorial: 01Hr/week		Credits: 3-1-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks Continuous Internal Evaluation: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 2 Hrs		
Prerequisite	Basic formulae of trigonometry, Derivative, Integration, Basic knowledge of Determinant and Matrices			
Objectives	1. To know the application of the matrix technique in finding find solution of system of linear equations that arises in many engineering problems. 2. To understand and solve higher order differential equations and apply them by mathematical modelling in various engineering problems. 3. To study and apply concept of transform.			
Unit-I	Complex Number: Introduction to complex number, De-Moivrer's theorem, root of complex number, circular function & hyperbolic function, relation between circular & hyperbolic function, inverse hyperbolic functions, separation of real & imaginary parts, Logarithm of complex quantity. (07 Hrs)			
Unit-II	Matrix: Introduction to matrix, rank of matrix-echelon form, normal form, solution of simultaneous linear equations (homogeneous & non homogeneous). Eigen values and Eigen vectors, Cayley-Hamilton theorem. (06 Hrs)			
Unit-III	Probability Distribution: Introduction, Probability distribution: Binomial distribution, Poisson distribution, Normal distribution. (05 Hrs)			
Unit-IV	Linear Differential Equation & Its Applications: Solution of n^{th} order linear differential equation with constant coefficients: Complementary function, Particular integral- short method, method of variation of parameters, Application of Linear differential equation to electrical circuit, Civil and mechanical. (06 Hrs)			
Unit-V	Laplace Transform : Definition, Laplace Transforms of elementary functions, Theorems and properties of Laplace transform (without proof): First shifting and second shifting theorem, Change of scale, Multiplication by t , Division by t , Laplace transform of Derivatives, Laplace transform of integral, Evaluation of integrals using Laplace transform, Laplace transform of Unit step function and Dirac's delta function. (06 Hrs)			
Unit-VI	Inverse Laplace transform: Definition, Inverse Laplace transforms using: a) Some elementary functions b) Theorem and properties of Laplace transform c) Partial fraction method d) Convolution theorem Application of Laplace transform to solve linear differential equations with given initial conditions (06 Hrs)			
Text books and References	Title	Author	Publication	Edition
	1.Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd	10 th
	2.Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	1 st
	3.Advanced Engineering Mathematics	C.R. Wylie	McGraw Hill Publications	6th
	4.Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publications	43th



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Course Code: CED-201 Course: Strength of Materials 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 Continuous Internal Evaluation: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 2 Hrs			
Prerequisite	Knowledge of Engg. Mechanics, Engineering Drawings, and Use of Scientific Calculator			
Objectives	1. To provide the basic concepts and principles of strength of materials. 2. To give an ability to calculate stresses and deformations of objects under external loadings.			
Unit-I	Simple stresses and strains: Stress and strain (linear, lateral, shear and volumetric), generalized Hooke's law. Elastic constants and their relationship for isotropic materials, Axial force diagram, stresses, strains and deformation in determinate and indeterminate homogeneous and composite bars under concentrated loads, thermal stresses. (06 Hrs)			
Unit-II	Shear force and bending moment diagrams: Concept and definition of shear force and Bending Moment, SFD and BMD for determinate beams, Beams under various kinds of loading, Stresses in beams due to bending, Theory of pure bending, Flexure formula. Bending stress distribution diagram, Moment of resistance and section modulus. (06 Hrs)			
Unit-III	Stresses in beams due to Shear forces: Shear stress distribution diagram for common symmetrical sections (with at least one axis of symmetry), maximum and average shear stress, Fletched beams (only theory). (04 Hrs)			
Unit-IV	Principal stresses and Strains: Concept, stress on oblique plane, two-dimensional stress system, planes of maximum shear stress, Mohr's circle diagram for principal stress. (06 Hrs)			
Unit-V	Columns and Struts: Concept of short and long columns, various end conditions, formulae by Euler and Rankine, Limitation of Euler's Formula, equivalent length, eccentrically loaded short compression members, Direct and bending stresses: Bending combined with axial loads, eccentrically loaded short struts. (06 Hrs)			
Unit-VI	Strain Energy: Strain energy due to gradually applied loads, suddenly applied loads impact loads (04 Hrs) Torsion of circular shaft, stresses, strains and deformation in determinate shafts of hollow and solid sections of homogenous and composite materials subjected to torsion. (04 Hrs)			
Text books and References	Title	Author	Publication	Edition
	1.Strength of Materials	S. Ramamrutham	Dhanpatrai and Sons	14 th
	2.Strength of Materials	R.K. Bansal	Laxmi	4 th
	3.Strength of Materials	S.S. Bhavikatti	Vikas publishers	4 th
4.Mechanics of Materials	R. C. Hibbler	Pearson Education	2 nd	



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Course Code: CED 202		Credits: 3-0-0			
Course: Surveying and Levelling		Mid Semester Examination-I: 15 Marks			
Teaching Scheme:		Mid Semester Examination-II: 15 Marks			
Theory: 03 Hrs/week		Continuous Internal Evaluation: 10 Marks			
Tutorial: 0 Hr/week		Teacher Assessment: 10 Marks			
		End Semester Examination: 50 Marks			
		End Semester Examination (Duration): 02 Hrs			
Prerequisite	Fundamentals of Basic Civil Engineering and Engineering Mathematics				
Objectives	<ol style="list-style-type: none"> To get introduced to different plane and geodetic surveying applications such as chain, compass, plane table, leveling, triangulation, trigonometric leveling. To understand the significance of each method in civil engineering and master the skill to carry out the proper surveying method in the field. To design numerical solutions for carrying out surveying in civil engineering field. To get introduced to modern advanced surveying techniques involved such as remote sensing, Total station, GPS etc 				
Unit-I	Introduction- Basic definitions, principle and uses of surveying, concept of scale, difference between map and plan, classification of surveying, overview on land surveying: ranging, chaining, and traversing, accessories for linear measurement, leader and follower, equipment's used for different types of surveying, Principles of chain surveying, equipment's for chain survey and plotting, errors in chaining, offsetting, well-conditioned and ill-conditioned triangle, instruments for measuring right angles, use of prismatic compass, principles of compass surveying concept of magnetic bearings, Local attraction, traversing with chain and compass, magnetic declination.(06Hrs)				
Unit-II	Compass Traversing Introduction and purpose, Principle of compass traversing, Method of Traversing, Check on Closed Traverse, Temporary adjustment of prismatic compass, Problems on Whole Circle Bearing, Fore bearing and back bearing, Magnetic declination, local attraction. (06 Hrs)				
Unit-III	Plane Table Survey Equipment required for plane table Survey, uses, advantages, disadvantages and errors in plane table surveying; Methods of plane table Survey Radiation, intersection, traversing and resection; Two point and Three point problems and their solutions by different methods (06 Hrs)				
Unit-IV	Contouring Definition, characteristics, uses, methods of locating contours, use of topo-sheets, profile leveling and cross-sectioning and their applications. (06 Hrs)				
Unit-V	Levelling Introduction to leveling, Types of leveling, Types of bench marks, Study and use of dumpy level, auto level, digital level and laser level in construction industry, principle axes of dumpy level, testing and permanent adjustments, reciprocal leveling, curvature and refraction corrections, distance to the visible horizon. (06 Hrs)				
Unit-VI	Theodolite Traversing- Definitions of different terms, measurement of horizontal angle repetition method and reiteration method, vertical angles, temporary and permanent adjustment of theodolite, direct method of measuring horizontal angle, methods of traversing, sources of error in theodolite, closing error and its limitation, trigonometrical leveling to find heights of objects. (06 Hrs)				
Text books and References	Sr. No.	Title	Author	Publication	Edition
	1.	Surveying and Leveling,	B.C.Punmiya	Laxmi Publication	4 th
	2.	Surveying and Leveling	N N Basak	Tata McGraw Hill	4 th
	3.	Remote sensing and GIS	K. Anjali Rao	BS Publications	3 rd



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Course Code: CED203 Course: Building Planning & Design Teaching Scheme: Theory: 3 Hrs/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous Internal Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 3 Hrs
Prerequisite	Fundamentals of Basic Civil Engineering and Engineering Mathematics
Objectives	1. To understand the importance of principles of planning and bylaws 2. To get introduced to different building materials and its uses 3. To plan and draw the building drawing with considering different parameters. 4. To Prepare Line Plan of residential and public buildings using principles of planning
Outcomes	1. The student shall be to Prepare Line Plan of residential and public buildings using principles of planning 2. The student shall be able to submission drawings & working drawing for building 3. The students should be able to calculate area statement of drawing 4. The student will be able to Identify and analyze different building components, their properties, and their applications in construction.
Unit-I	Building Materials - classification of building materials, requirements of building materials and products, functional, aesthetical and economic. Surface Finishes-Pointing: types, plastering: materials and types, painting, materials and products based on mineral binders, gypsum, lime, plaster of Paris, cement, hydraulic lime, mortars and concrete, gypsum-concrete products. Paints and Varnishes: types and uses. (06 Hrs)
Unit-II	Bricks and Tiles- Structural Clay products, Classification, Common clay brick, face bricks and tiles, ceramic tiles, paving blocks. Brick masonry, stone masonry and block masonry. Doors – Types and Material used, Windows- Types and materials used, Floors - types of floors, floor finishes, suitability. Roofs- materials used types, wooden and steel trusses, roof coverings, roof drainage. (06 Hrs)
Unit-III	Principles of planning of Residential and Public building- Aspect, Prospect, Orientation, Grouping, Privacy, Elegance, Flexibility, Roominess, Circulation, Sanitation, Furniture Requirement, and Economy. Norms and different requirement for minimum dimensions of different units in the residential and public building as per IS 962-1989. (06 Hrs)
Unit-IV	Bye-laws: Rules and Bye-laws of sanctioning authorities for construction work. Necessity of laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), marginal distances, building line control line, height regulation, room sizes, types of area calculations – built-up area, floor area, carpet area, Rules for ventilation, lighting, drainage, sanitation and parking of vehicles ; Landscape elements and elements of interior decoration. (06 Hrs)
Unit-V	Perspective Drawing- concept, types, terms used and principles of perspective drawing, one point & two-point perspective for buildings. (06 Hrs)
Unit-VI	Drawing of single storey framed structure (3-BHK) with staircase-developed plan, elevation, section, site plan, schedule of openings, construction notes with specification, area statement(manually or using any software) (06 Hrs)



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	Title	Author	Publication	Edition
Text books and References	1. Building Drawing	Shah M.G. Kale. M. & Patki SY	Tata Mcgraw Hill	4 th
	2. Planning & Designing of buildings	Y.S. Sane	PVG Prakashan	4 th
	3. Building Planning and Drawing	Swamy Kumara Rao, Kameshwara A.	Charotar Publication Anand	4 th
	4. Principles of Perspective Drawing	M.G. Shah & C.M. Kale	TMH	6 th
	5. Building Construction	Bhavikatii S.S.	Vikas Publication House Delhi	4 th


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Course Code: CED204 Course: Concrete Technology Teaching Scheme: Theory: 03 Hrs/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous Internal Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 02 Hrs
Prerequisite	Knowledge of chemistry is required
Objectives	1. To understand properties of cement and concrete 2. To study the design of concrete mix design 3. To study the high performance concrete and its properties 4. To study the Non-Destructive testing of concrete
Unit-I	Cement: Manufacturing, chemical composition, types of cement and their properties, hydration process, physical and chemical tests and standards. Admixtures and Construction Chemicals: Water reducers, Air entraining agents set controllers-its properties and effects on concrete properties. Introduction to supplementary cementing materials. Its production, properties and effects on concrete properties. (06 Hrs)
Unit-II	Fine Aggregate: Classification, particle size distribution, fineness modulus, grading curves, specific gravity, moisture content, bulking of sand, water absorption, bulk density and standard specifications. Coarse Aggregate: Types, particle size distribution, fineness modulus, grading curves moisture content, specific gravity, absorption, bulk density, flakiness index, elongation index, crushing value, impact value, abrasion and attrition and standard specifications. (06 Hrs)
Unit-III	Concrete production: Batching, mixing, transporting, placing, compaction, curing and finishing. Fresh concrete: Workability and its measurement, cohesiveness, segregation, bleeding, setting and its measurement, functioning of ready mix concrete plants (06 Hrs)
Unit-IV	Concrete Mix Design: Fundamentals of concrete mix proportioning, characteristic strength of concrete, quality control, methods of concrete mix proportioning: IS, ACI and DOE methods. Introduction to high strength concrete. (06 Hrs)
Unit-V	Testing of Hardened Concrete: Compressive strength, tensile strength, modulus of elasticity and Poisson's ratio and its computation, destructive and non-destructive testing's, permeability, creep and shrinkage: measurement and parameters affecting them. Introduction to durability of concrete and factors affecting it. (06 Hrs)
Unit-VI	Special concrete: Light-weight concrete, Light-weight aggregate concrete, aerated concrete. No-fines concrete, high density concrete, types of fibers, factors affecting properties of FRC and its applications. (06 Hrs)



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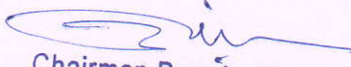
Text books and References	Sr. No.	Title	Author	Publication	Edition
	1.	Plain & reinforced concrete	O.P. Jain & Jaikrishna	Nem Chand	8 th
	2.	Concrete technology, theory and practice	M.S. Shetty	S.Chand	8 th
	3.	Relevant I.S. codes.			


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Course Code: CED221 Course: Lab-I: Strength of Materials Teaching Scheme: Practical: 2 Hrs/week		Credits: 0-0-1 Oral/Practical: 25 Marks
Objectives	To give an ability to apply the knowledge of strength of materials on engineering Applications and design problems.	
List of Practicals	Any ten experiments to be performed: <ol style="list-style-type: none">1. Tension test on the ductile materials (Mild steel and TOR steel/HYSD steel)2. Compression test on concrete cube/brick/ Autoclaved aerated concrete3. Single shear test on metals4. Single shear test on metals5. Double shear test on metals6. Flexural test on concrete /timber beam7. Charpy test on metals8. Izod test on metals9. Rockwel hardness test10. Brinell hardness test11. Testing on bricks/Autoclaved aerated concrete (AAC) blocks-water absorption12. Torsion test on steel13. Abrasion test on flooring tiles.14. Transverse test on flooring tiles.	
The assessment of term work shall be done on the basis of the following. <ul style="list-style-type: none">• Continuous assessment• Performing the experiments in the laboratory• Oral examination conducted on the syllabus and term work mentioned above.		


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Course Code: CED222		Credits: 1-0-0 Oral/Practical: 25 Marks
Course: Lab-II: Surveying and Levelling		
Teaching Scheme: Practical: 2 Hrs/week		
Objectives	:	To know the concepts and methods of measurement of lands and handle equipments required for surveying and leveling works.
List of Practicals	:	<ol style="list-style-type: none">1. Measurement of magnetic bearings of sides of a triangle or polygon, correction for local attraction and calculations of true bearings using prismatic compass.2. Plane table surveying by radiation, intersection,3. Plane table surveying by traversing method.4. Measurement of horizontal and vertical angles by using 20'' theodolite.5. Simple and differential levelling with at least three change points using auto level.6. A project on plane table traversing7. Map editing, vector and raster analysis of digitized map by using suitable GIS software.

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.



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Course Code: CED223 Course: Lab-III: Building Planning & Design Teaching Scheme: Practical: 2 Hrs/week	Credits: 0-0-1 Teacher Assessment: 25 marks Oral/Practical: 25 marks
Objectives	<ol style="list-style-type: none">1. To understand the importance of principles of planning and bylaws used for building planning2. To plan and draw the building drawing with considering different parameters.
List of Practicals	<ol style="list-style-type: none">1. Collect detailed set of drawings of flat scheme from construction site and study it.(Field Visit to Construction Site)2. Measured the college building and draw the line plan of measured college building.(MIT College Building)3. Draw line plan to suitable scale residential bungalow (1 BHK, staircase, WC and Bathroom) (Full imperial sheet)4. Prepare Submission Drawing to scale 1:100 of (G+1) load bearing structure residential building (2 BHK) with flat roof and staircase showing i) developed plan ii) elevation iii) section passing through stair, WC and Bath iv) site plan (1:200) and area statement v) Schedule of Opening and construction notes. (Draw Sheet)5. Prepare working drawing to scale 1:100 of (G+2) framed structure residential building (2 BHK) with flat roof and staircase showing i) developed plan ii) elevation iii) section passing through stair, WC and Bath iv) site plan (1:200) and area statement v) Schedule of Opening and construction notes vi) foundation plan (using CAD Software)6. Prepare double line plans of public building to suitable scale (Post Office/ Railway Station/ Airport / Hospital) (Draw sheet/ CAD)
The assessment of term work shall be done on the basis of the following. <ul style="list-style-type: none">• Continuous assessment• Performing the experiments in the laboratory• Oral examination conducted on the syllabus and term work mentioned above.	


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Course Code: CED 224 Course: Lab-IV: Concrete Technology Teaching Scheme: Practical: 02 Hrs/week	Credits: 0-0-1 Teacher Assessment: 25 mark
Objectives	1. To understand properties of cement and concrete 2. To study the Non-Destructive testing of concrete
List of Practical	Any <i>twelve</i> experiments to be performed: <ol style="list-style-type: none">1. Fineness test on cement2. Consistency test on cement3. Initial and final setting time test of cement4. Compressive strength test on cement5. Soundness test on cement6. Fineness modulus of fine aggregate and coarse aggregate7. Bulking of sand8. Slump test on concrete9. Compaction factor test on concrete10. Vee-Bee test on concrete11. Flow table test12. Compression test on concrete cubes13. Rebound hammer test

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.


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Course Code: CED225		Credits: 0-0-1 Teacher Assessment: 25 Marks
Course: Lab-V: Software Programming (Data Analytics)		
Teaching Scheme: Practical: 2 Hrs/week		
Objectives	<ul style="list-style-type: none">• Understand the R Programming Language.• Exposure on visualizing data science problems.• Understand the classification and Regression Model.	
List of Practicals	<ol style="list-style-type: none">1. Introduction to R Programming and Study of basic Syntax in R2. R as a Calculator application:<ol style="list-style-type: none">a. Using with and without R objects on consoleb. Using mathematical functions on consolec. Write an R script, to create R objects for calculator application and save in a specified location in disk.3. Descriptive Statistics In R<ol style="list-style-type: none">a. Write an R script to find basic descriptive statistics using summary, str, quartile functionb. Write an R script to find subset of dataset by using subset (), aggregate () functions on sample dataset4. Reading and Writing Different Types of Datasets<ol style="list-style-type: none">a. Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location.b. Reading Excel data sheet in R.c. Reading XML dataset in R.5. Visualizations<ol style="list-style-type: none">a. Find the data distributions using box and scatter plot.b. Find the outliers using plot.c. Plot the histogram, bar chart and pie chart on sample dataStudy and implementation of various control structures in R and calculate mean mode median for a dataset6. Correlation and Covariance<ol style="list-style-type: none">a. Find the correlation matrix.b. Find the outliers using plot.c. Plot the correlation plot on dataset and visualize giving an overview of relationships among data.7. Regression Model Import a data from web storage. Name the dataset and now do Linear/Logistic Regression to find out relation between variables that are affecting the admission of a student in an institute based on his or her entrance score8. Classification Model<ol style="list-style-type: none">a. Install relevant package for classification.b. Choose classifier for classification problem.c. Evaluate the performance of classifier.9. Clustering Model<ol style="list-style-type: none">a. Clustering algorithms for unsupervised classification.b. Plot the cluster data using R visualizations.10. Mini Project	




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Course Code: HSM804 Course: Constitution of India (Mandatory non-credit course) Teaching scheme: Theory: 2 hrs. / week	Credits: 0-0-0
Prerequisite	1. Willingness to learn
Objectives	2. To create awareness about the constitution of India 3. To know different sections/articles of the constitution of India and their significance.
Unit-I	Meaning and Concept of Indian Constitution; Nature of Constitution; Brief Idea of Indian Constitution [Parts, Articles and Schedule] (02 Hrs)
Unit-II	Salient Features of Indian Constitution Written and Enacted Constitution; The longest and most detailed Constitution of the World; Rigidity and Flexible Constitution; Parliamentary system of Government; Federal system with unitary bias; Adult Franchise; Single Citizenship; Sovereign, Democratic, Republic; Secularism; Directive Principles of State Policy; Independent Judiciary; Fundamental Rights; Fundamental Duties. (05 Hrs)
Unit-III	A. Fundamental Rights Concept of State (Art. -12); Right to Equality (Art. -14 to 18); Right to Freedom (Art. -19 to 22); Right against Exploitation (Art. -23 & 24); Right to Religion (Art. -25 to 28); Right of Minorities (Art. -29 & 30); Constitutional Remedies (Art.-32). Fundamental Duties (Art.-51 A) (05 Hrs)
Unit-IV	Directive Principles of State Policy (DPSP's) Meaning and Significance of Directive Principles; Classification/ Principles of D.P.S.P.; Relationship between F.Rs. and D.P.S.P. (04 Hrs)
Unit-V	Executives A) Union Government The President, Council of Ministers, and Prime Minister. B) State Government The Governor, Council of Ministers and Chief Minister (04 Hrs)
Unit-VI	Election Commission: Election Commission: Role and Functioning; Chief Election Commissioner and Election Commissioners; State Election Commission: Role and Functioning; Institute and Bodies for the welfare of SC/ST/OBC and women. (04 Hrs)



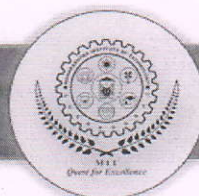
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Text books and References	Sr. No.	Title	Author	Publication	Edition
	1.	Constitution of India, Bare Act. Govt. of India	Constitution of India, Bare Act. Govt. of India	Constitution of India, Bare Act. Govt. of India	-
	2.	Our Constitution (AN Introduction of Indians Constitution and Constitutional Law	Subhash C Kashyap	National Book Trust, India	2001
	3.	Indian Constitution,	Avasthi &, Maheshwarii	Lakshmi Narain Agrawal, Agra	2017
	4.	Introduction to the Constitution of India	Basu D.D.,	Lexis Nexis,	2013
	5.	Indian Prime Minister	Sharma L.N.	the Macmillan Company of India,	1976
	6.	Union Executive,	Jain H.M.	Chaitanya Publishing House,	1969.
	7.	Dr. B.R. Ambedkar, Framing of Indian Constitution (1 to 6 Volume)	Dr. S.N. Busi,	Ava Publishers	First Edition, 2016
	8.	Indian Constitution Law,	M.P. Jain,	Nexis	7th Edn. 2014
	9.	Outlines of Indian Legal and Constitutional History,	M.P. Jain,	Lexis Nexis,	2014


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Course Code: BSC251-B Course: Complex Variable & Vector Calculus Teaching Scheme: Theory: 03 Hrs/week Tutorial: 01Hr/week	Credits: 3-1-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Teacher Assessment: 10 Marks Continuous Internal Evaluation: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 2 Hrs
Prerequisite	Basic formulae of trigonometry, Derivative, Integration, algebra of complex numbers, fundamentals of vector algebra.
Objectives	1. To develop the mathematical skills of the students related to function of complex variables. 2. To make the students familiarize with concept of vector differentiation and vector integration. 3. To apply mathematical concepts for solving the practical problems in engineering and technology.
Unit-I-	Function of Complex Variable: Introduction , Analytic function ,Cauchy-Riemann equation in Cartesian and polar coordinates ,Harmonic function, orthogonal system , Integration in complex plane: Line integral, Contour integral, Cauchy's integral theorem , Cauchy's integral formula, Extension of Cauchy's theorem on multiply connected region, Singularities, Residues, Cauchy's residue theorem. (07 Hrs)
Unit-II	Fourier Series: Definition, Dirichlet's conditions; Fourier series for function having period $2L$; Fourier series for even and odd function, half range expansion; Fourier sine and cosine series. (06 Hrs)
Unit-III	Fourier Transform: Fourier integral theorem (without proof), Fourier sine and cosine integral, Fourier sine and cosine transform, inverse Fourier transform, inverse Fourier sine and cosine transform. (05 Hrs)
Unit-IV	Vector Differentiation: Differentiation of vectors, Scalar and Vector point functions, Gradient of a scalar point function, Directional derivative, Divergence and Curl of vector point function, Irrotational and Solenoidal vector fields. (06 Hrs)
Unit-V	Vector Integration: Line integral, Work done by a force, Surface integral, Green's theorem, Stokes's theorem. (06 Hrs.)
Unit-VI	Application of Partial Differential Equation Solution of partial differential equation by method of separation of variables, Applications to i. Vibration of a string (Wave equation) (without proof) ii. One dimensional heat flow equation (Diffusion equation) (without proof) iii. Two dimensional heat flow equation (Diffusion equation) (without proof). (6 Hrs)



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	Title	Author	Publication	Edition
Text books and References	1. Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd	10 th
	2. Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	1 st
	3. Advanced Engineering Mathematics	C.R. Wylie	McGraw Hill Publications	6 th
	4. Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publications	4 th


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<p>Course Code: CED252 Course: Fluid Mechanics Teaching Scheme: Theory: 3 Hrs/week</p>	<p>Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous Internal Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 2 Hrs</p>
Prerequisite	Basic knowledge about general physics, math, calculus, differential equations.
Objectives	<p>1. To study the behavior of fluid under static, kinematic and dynamic conditions.</p> <p>2. To apply mass, momentum, energy equation to fluid flow.</p>
Unit-I	<p>a) Fluid Properties Scope, Relevance of Fluid Mechanics, Physical properties of fluids: Newton's Law of Viscosity, Rheological diagram, compressibility, cohesion, adhesion, surface tension, capillarity, vapour pressure.</p> <p>b) Dimensional analysis and similarity Dimensions of physical quantities, Dimensional homogeneity, Dimensional homogeneity, Raleigh and Buckingham π theorems, Model laws; distorted and undistorted models. Similitude-Types of similarities. (06 Hrs)</p>
Unit-II	<p>a) Measurement of pressure & Hydrostatics force on surfaces The basic equation of hydrostatics, concept of pressure head, Measurement of pressure datum (absolute, gauge), Application of the basic equation of hydrostatics. Types of manometers, Introduction to pressure transducers. Total pressure, Center of pressure for plane and curved surfaces, Pressure Diagrams</p> <p>b) Buoyancy and Floatation Principle of floatation and buoyancy, equilibrium of floating bodies, Equilibrium of floating bodies and submerged bodies, stability of floating bodies. Metacenter and metacentric height and its determination. Relative Equilibrium.(06Hrs)</p>
Unit-III	<p>Fluid Kinematics Methods for describing the motion of fluid; Velocity and acceleration of fluids, Type of flow: Steady and unsteady, uniform and nonuniform, Laminar and Turbulent, one, two and three dimensional flows, Stream line, path line, streak line and stream tube; stream function, velocity potential function. (06Hrs)</p>
Unit-IV	<p>Fluid Dynamics Forces acting on fluid in motion, Euler's equation, Bernoulli's Equation, Momentum equation, correction factors. Measurement of Flow: Venturimeter, orifice meter, Pitot tube, orifices, mouthpieces, flow over notches and weirs. (06 Hrs)</p>
Unit-V	<p>a) Turbulent Flow: Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness,</p>



	b) Flow through pipes Energy losses in pipe flow (major losses and minor losses), Darcy Weisbach Equation, variation of friction factor for laminar flow and for turbulent flow, Moody's diagram, explicit equation for friction factor, flow through pipes such as simple, compound, series parallel, branched pipes, siphon, Dupuit's equations (06Hrs)			
Unit-VI	Flow through open channels Difference between pipe flow and open channel flow. Types of channels. Types of open channel flow, Geometric shapes of channel sections and their expressions, economic channel sections. specific energy diagrams, alternate depths, Froude number, specific force, critical flow. Non-uniform flow in channels, slope profiles, measurement of flow in channels, standing wave flume, ventur-flume. Hydraulic jump, energy dissipation. (06Hrs)			
Text books and References	Title	Author	Publication	Edition
	1. Fluid Mechanics and Hydraulic Machines	R. K. Bansal	Laxmi Publications	4 th
	2. Hydraulics and Fluid Mechanics	P.N. Modi and S.M. Seth	Standard Book House	14 th
	3. Fluid Mechanics	Hydraulic Machines	Dhanpatrai Publications	8 th
	4. Fluid Mechanics	V. L. Streeter & E. B. Wylie	TMH Publications	3 rd


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Course Code: CED253 Course: Theory of Structure Teaching Scheme: Theory: 3 Hrs/week		Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous Internal Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 2 Hrs			
Prerequisite	Knowledge of strength of material				
Objectives	1. To understand the Basic concept of Structural Analysis. 2. To understand the Various Methods of Structural Analysis.				
Unit-I	a) Basic concepts of Structural Analysis – Types and Classification of structures based on structural forms. Skeletal Structures, Surface Structures, 3D Structures. b) Concept of indeterminacy and degrees of freedom - Static and Kinematic degree of Indeterminacy. (4Hrs)				
Unit-II	a) Concept of strain energy, strain energy due to axial load and bending moment. b) Energy Methods in Structural analysis Deflection of determinate & indeterminate structures – beams, frames and pin jointed frames by Unit Load Method & Castigliano's theorems, Maxwell's theorem of reciprocal displacements and Betti's law. (6Hrs)				
Unit-III	a) Three moment theorem and its application for continuous beams. b) Stiffness matrix method for continuous beams & rectangular portal frames. (6Hrs)				
Unit-IV	Analysis of continuous beams and portal frame by a) Slope deflection method. b) Moment distribution method. (8Hrs)				
Unit-V	Moving Loads and Influence Lines concept of influence lines, influence lines for reaction, shear force, bending and deflection of determinate beams, influence line diagram (ILD) for forces in determinate frames and trusses, concept of equivalent UDL, absolute maximum bending moment and shear force, Introduction to moving loads, analysis for different types of moving loads, single concentrated load, several concentrated loads, uniformly distributed load shorter and longer than span, application of Muller Breslau principle for determinate structures to construct ILD. (6Hrs)				
Unit-VI	Arches, Cables & Suspension Bridges circular, parabolic and geometric arches, analysis of three hinged and two hinged arches, concept of radial shear force and axial thrust, effect of yielding of supports, rib shortening and temperature changes. Analysis of forces in cables, suspension bridges with three hinged and two hinged stiffening girders, Eddy's theorem. (6Hrs)				
Text books and References	Sr. No.	Title	Author	Publication	Edition
	1.	Structural Analysis Volume – I	Devdas Menon	Narosa Publication	2 nd
	2.	Structural Analysis Volume – I	Bhavikatti	Vikas Publishers.	3 rd
	3.	Basic Structural Analysis	C S Reddy	Tata McGraw Hill	3 rd



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Course Code: CED254 Course: Engineering Geology Teaching Scheme: Theory: 3 Hrs/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous Internal Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 2 Hrs
Objectives	1. To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation 2. To learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects
Unit-I	Introduction- Branches of geology useful to civil engineering, scope of geological studies in various civil engineering projects. Department dealing with this subject in India and their scope of work Mineralogy- Mineral, Origin and composition, Physical properties of minerals, susceptibility of minerals to alteration, basic of optical mineralogy, Rock forming minerals, megascopic identification of common primary & secondary minerals. (06 Hrs)
Unit-II	Petrology-Rock forming processes. Specific gravity of rocks. Ternary diagram. Igneous petrology-Volcanic Phenomenon and different materials ejected by volcanoes. Types of volcanic eruption. Concept of Hot spring and Geysers. Characteristics of different types of magma. Division of rock on the basis of depth of formation, and their characteristics. Chemical and Mineralogical Composition. Texture and its types. Various forms of rocks. IUGS Classification of phaneritic and volcanic rock. Field Classification chart. Structures. Classification of Igneous rocks on the basis of Chemical composition. Detailed study of Acidic Igneous rocks like Granite, Rhyolite or Tuff, Felsite, Pegmatite, Hornfels. Metamorphic Aureole, Kaolinization. Landform as Tors. Engineering aspect to granite. Basic Igneous Rocks Like Gabbro, Dolerite, and Basalt. Sedimentary petrology- mode of formation, Mineralogical Composition. Texture and its types, Structures, Gradation of Clastic rocks. Classification of sedimentary rocks and their characteristics. Detailed study of Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone Metamorphic petrology- Agents and types of metamorphism, metamorphic grades, Mineralogical composition, structures & textures in metamorphic rocks. Important Distinguishing features of rocks as Rock cleavage, Schistosity, Foliation. Classification. Detailed study of Gneiss, Schist, Slate with engineering consideration (06 Hrs)
Unit-III	Strength Behavior of Rocks- Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Dip and Strike. Outcrop and width of outcrop. Inliers and Outliers. Main types of discontinuities according to size. Fold- Types (Anticline and syncline, symmetrical and asymmetrical fold, Isoclinal' fold, Recumbendant fold.) and nomenclature, Criteria for their recognition in field. Faults: Classification (normal fault and reverse fault, strike fault, dip fault, oblique fault, Hurst and Graben), recognition in field, effects on outcrops. Joints & Unconformity- Types, Stresses responsible, geotechnical importance. Importance of structural elements in engineering operations. Consequences of failure as land



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	sliding, Earthquake and Subsidence. Strength of Igneous rock structures. (06 Hrs)			
Unit-IV	Geological Hazards- Rock Instability and Slope movement: Concept of sliding blocks. Different controlling factors. Instability in vertical rock structures and measures to prevent collapse. Types of landslide. Prevention by surface drainage, slope reinforcement by Rock bolting and Rock anchoring, retaining wall, Slope treatment. Case study on black clay. Ground water- Factors controlling water bearing capacity of rock. Pervious & impervious rocks and ground water. Lowering of water table and Subsidence. Earthquake- Magnitude and intensity of earthquake. Seismic sea waves. Revelation from Seismic Records of structure of earth. Case Study on Elevation and Subsidence in Himalayan region in India. Seismic Zone in India. (06 Hrs)			
Unit-V	Building stones– Requirements of good building stones such as strength, durability, appearance, availability, field characters and its dependence on geological characters of rock. Factors affecting strength, building stones of India. Landslides– Definition of landslide, Rock fall, soil creeps. Angle of repose, causes of landslide, stability of hill slopes, dip of bed and direction of slope. Preventive measures for landslides. (06 Hrs)			
Unit-VI	Core logging– Diamond and calyx drill machine, inclined and large diameter drill hole, core recovery, rock quality designation, drill water loss, preservation of cores. Tunneling– Tunnel, Adit and Shaft. Difficulties During Tunneling like seepage of groundwater, over break, Support during tunneling, lining after tunneling, rate of tunneling and influence of geological conditions on these. Tunneling through hard rock and soft rocks. Tunnels in folded strata, Tunnels across fracture zones, fault zones, Tunnels in closely jointed rocks, Tunnels in sedimentary rocks. (06 Hrs)			
Text books and References	Title	Author	Publication	Edition
	1. Engineering and General Geology	Parbin Singh	K Kataria & Sons	8 th
	2. Engineering Geology	N.C. Kesavulu	Macmillan Publishers	2 th
	3. Geology for Geotechnical Engineers	J. C. Harvey	Cambridge University	3 th




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Course Code: CED231 Course: Environmental Pollution & Control (Professional elective-I)		Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous Internal Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 2 Hrs
Teaching Scheme: Theory: 3 Hrs/week		
Prerequisite	Knowledge of Environmental Science	
Objectives	1. Student will be acquainted with various types of pollutions, their units, measurement, and instruments in practice. 2. To make the environment pollution free. Engineers have significant role for human being, animals and plants.	
Unit-I	Air Pollution- Types of pollutants, source effects, sink and control of primary pollutants – CO, Nox, HC, Sox and particulates, effects of pollutants on man and environment –photochemical smog and acid rain. Industrial hygiene- sources of dust and gaseous Pollutants in the industry occupation Hazards, Exposure tolerance level Protection Measures, Legal control. (06 Hrs)	
Unit-II	Noise Pollution- Definition, Decibel levels of common noises, Hazards of noise pollution, Measures for noise reduction, control of noise pollution. The menace of noise pollution in India-Abstract Introduction-Engineering description of noise and sound Hearing principle- Frequency Analysis -Noise standards Noise control terms & units. Noise Pollution: Introduction, The describe scale, effects of noise – physiological and psychological effects, Measurement of noise levels, Noise control in industrial establishments. (06 Hrs)	
Unit-III	Soil Pollution: Composition of soil, classification and effects of soil pollutants and their control (06 Hrs)	
Unit-IV	Solid Waste Pollution: Classification, waste treatment & Disposal methods (Composting, sanitary land filling, thermal processes, recycling and reuse). Origin of domestic solidwastes, refuse analysis composition & quantity of refuse & transportation of refuse, economics of refuse collection. Solid waste in industries, agricultural waste – its effect on environment. Solid waste handling methods, treatment & disposal of solid wastes. Sanitary land fills lechates and latest methods (06 Hrs)	
Unit-V	Composting : Theory of composting, design of composting plant, recovery of bio-energy from organic waste. Incineration, Pyrolysis & its by-products. Cost economics studies in solid waste management. Introduction to linear programming & transportation problem, route & cost optimization. Cost economics studies in solid waste management. (06 Hrs)	
Unit-VI	Hazardous Wastes: Classification – radioactive, biomedical and chemical, treatment and disposal –physical, chemical and biological processes. Environmental Toxicology and control, toxic effects and control of metal pollutants like Hg, Col, Pb, V, Cr, Co, etc. Disease measurement and control of occupational diseases. Environmental Pollution Monitoring Instruments, Air Pollution monitoring Instruments CO, SO2 Hydrocarbons and Ozone, Water pollution monitoring instruments (06)	



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Text books and References	Title	Author	Publication	Edition
	1.Environmental Pollution Analysis	S. M. Khopkar	New Age	7 th
	2.Environmental Engineering	H. S. Peavy & D R Rowe	Tata McGraw Hill	5 th
	3.Environmental Pollution Control	C. S. Rao	Tata McGraw Hill	6 th



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Course Code: CED 232 Course: Advance Surveying (Professional elective-I)		Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous Internal Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 02 Hrs
Teaching Scheme: Theory: 03 Hrs/week		
Prerequisite	Fundamentals of Basic Civil Engineering and Engineering Mathematics	
Objectives	1. To understand the Modern surveying instruments 2. To study the Tachometric surveying 3. To study the Global positioning system 4. To study the QGIS surveying	
Unit-I	Advance Surveying Equipments Basics of Digital Theodolite, Introduction and Principles of E.D.M., Introduction and Basics of Total station:- Parts of Total station, Advantages, disadvantages and uses of Total Station, Types of Total Station, Advancement in Total Station Technology, Automatic Target Recognition ATR, Surveying using Total Station:-Flow chart of data collection, Fundamental Parameters of Total Station, Precautions to be taken while using Total Station, Field equipments Set up of Total Station, Centering, Levelling, back-sight, Azimuth Marks, Measurement with Total Station, Total Station Initial Setting, Field Book recording, Total Station Traversing (06 Hrs)	
Unit-II	Photogrammetry Objects, applications to various fields, aerial camera, comparison of map & vertical photograph, vertical tilted and oblique photographs, scale of vertical photograph, Mirror Stereoscope, photo interpretation, etc. Geographic Information System (GIS): definition and meaning, data modes for GIS, components of GIS, and application to Civil Engineering, etc. (06 Hrs)	
Unit-III	Tacheometric surveying Principles and uses, advantages, stadia tacheometry, different methods of tacheometer, anallatic lens- object and theory, fixed hair method, reduction of readings, subtense bar method, location details by tacheometer, stadia diagram and tables, error and precisions in stadia tacheometry survey work. (06 Hrs)	
Unit-IV	Curves Curves- Definitions of different terms, necessity of curves and types of curves. Simple circular curves and compound curves, office and field work, linear methods of setting out of curves. Angular methods for setting out of curves, two Theodolites and Rankine's deflection angle methods. Reverse and transition curves, their properties and their advantages, design of transition curves, shift, spiral angle, Composite curves – office and field work, setting out of curve by angular method, composite curve problems, Vertical curves – definitions, geometry and types, tangent correction and chord gradient methods, sight distance on a vertical curve, difficulties in setting out curves and solutions for the same. (06 Hrs)	


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Unit- V	Remote Sensing Introduction, Fundamental Principle of Remote Sensing, Brief History of Indian Remote Sensing (IRS), Classification of the Features on the Earth Surface, Electromagnetic Radiation, Principle of Satellite Motion, Types of Satellite Velocity Geographical Information System (GIS) Introduction, Development of Mapping Techniques, Development of Topsheets, Types of Features on Earth's Surface, Spatial Data, Data Sources, Influence of Maps on the Character of Spatial Data, Topology, Scales of the Special Data, Components of a GIS (06 Hrs)				
Text books and References	Sr. No.	Title	Author	Publication	Edition
	1	Surveying	R Agor	Khanna Publishers	4 th
	2	Concepts and Techniques of GIS	Lo C.P.Yeung A K W	Prentice Hall	6 th
	3	Introduction to GIS	Kang-tsung Chang	Tata McGraw Hill	5 th


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Course Code: CED233 Course: Railway & Airport Engineering (Professional elective-I) Teaching Scheme: Theory: 03 Hour/week		Credits: 3-0-0 Mid Semester Exam-I: 15 Marks Mid Semester Exam-II: 15 Marks Continous In Assessment: 10 Marks Teacher Assessment: 10 Marks End Semester Exam: 50 Marks End Semester Exam (Duration): 02 Hours
Course Objectives	<ol style="list-style-type: none">1. To expose the students to Railway planning, design, construction and maintenance and planning and design principles of Airports and Harbours.2. Illustrate the basic procedure of railway construction and its maintenance.3. Students will also know the planning of airport and its components in layout.4. To impart knowledge to students the airport design and understood the basic needs in the airport construction.5.	
Unit-I	Railway Track: Permanent way, Gauges in Railway Track, Rails, Creep of Rails, Sleepers, Ballast, Fitting and fastening, Stresses on Railway track, coning of wheels, Stresses in the railway Track, defects in rails, Route alignment surveys, Stations and Yards, Maintenance of Track. (6 Hours)	
Unit-II	Geometric design of Track: Gradients & Grade Compensation, Safe Speed, Curve Designation by radius & degree of curve. Superelevation, negative superelevation and Cant deficiency, Transition Curves. Hauling Capacity. (6 Hours)	
Unit-III	Track Junction: Points and Crossing, Turnouts, Symmetrical split, three throw switch, Diamond crossing, Cross overs, Gauntlet track and Fixed-point system, Scissor cross over, Gathering lines or Ladder tracks, Triangle. Signaling and Control System: Operating characteristics, <i>Functional</i> characteristics, Locational characteristics, Special characteristics. (6 Hours)	
Unit-IV	Airport Planning: Site selection, Characteristics of Aircraft, Classification of Airport. Airport Capacity, Runway Capacity, Gate Capacity, Taxiway Capacity. (6 Hours)	
Unit-V	Runway Design: Runway Orientation, Cross wind component and Wind Coverage, Wind Rose, Basic Runway Length, Correction to basic runway length. (6 Hrs)	
Unit-VI	Taxiway Design: Geometric standards for taxiway: Length of taxiway, Longitudinal gradient, Turning Radius. Planning and design of Terminal Area. Airport Markings, Airport lighting. Drainage system of Airport. (6 Hours)	



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Text books and References	Sr. No.	Title	Author	Publication	Edition
	1	Railway Engineering	Satish Chandra and Agarwal M.M.	Oxford University Press, New Delhi	2007
	2	Railway Engineering	S. C. Saxena & S. P. Arora	Dhanpat Rai Publication	2010
	3	Airport Planning and Design	Khanna S. K. & Arora M. G.	Nemchand and Brothers, Roorkee	-
	4	Airport Engineering	S. C. Rangwala	Charotar Publishing house	-


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Course Code :CED271 Course: Lab-I: Fluid Mechanics		Credits: 0-0-1
Teaching Scheme: Practical: 2Hrs/week		Oral: 25 Marks
Objectives	:	1.To expose various pressure and flow measuring devices 2. To determine the various parameters related to fluid flow in pipes and in open channels.
List of Practical	:	1. Study of pressure measuring devices 2. Determination of metacentric height 3. Verification of Bernoulli's equation. 4. Calibration of Venturimeter. 5. Determination of coefficient of discharge for an orifice and mouthpiece. 6. Calibration of rectangular and triangular notch. 7. Determination of Chezy's and Manning's constants 8. Determination of co-efficient of discharge for venturi-flume /standing wave flume 9. Determination of pipe friction factor. 10. Determination of minor losses. 11. Study of hydraulic jump.

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.


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Course Code: CED272 Course: Lab-II: Theory of Structures		Credits: 0-0-1 TA: 25 marks
Teaching Scheme: Practical: 2 Hrs/week		
Objectives	:	Students should be able to understand and apply the concept of structural Analysis.
List of Practical	:	<ol style="list-style-type: none">1) Static indeterminacy of Beams, Frames & Trusses.2) Kinematic indeterminacy of Beams, Frames & Trusses.3) Numerical Based on Strain Energy & its application.4) To find Deflections of Beams, Frames and trusses by Various Methods.5) Numerical on Three Moment Theorem and Stiffness method6) To draw influence lines for Reaction, shear force and bending moment for the beams.7) Numerical of ILD based on Train of Wheel Loads.8) Analysis of Continuous beam and frame by MDM9) Analysis of Continuous beam and frame by SDM.10) Numerical on Three hinged parabolic arch and Suspension Cables.

The assessment of TA 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.


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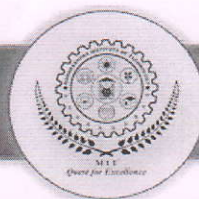


Course Code: CED273 Course: Lab-III: Engineering Geology		Credits: 0-0-1 Oral/Practical: 25 Marks
Teaching Scheme: Practical: 2 Hrs/week		
Objectives	1. To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation	
List of Practicals	<p>1. Mineralogy -Study of physical properties of minerals, Identification of minerals: Silica group: (Quartz, Amethyst, Opal); Feldspar group: (Orthoclase, Plagioclase); Cryptocrystalline group: (Jasper); Carbonate group: (Calcite); Element group: (Graphite); Pyroxene group: (Talc); Mica group: (Muscovite); Amphibole group: (Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum)</p> <p>2. Igneous Petrology - Study of mineral composition. texture, classification of igneous rocks. Identification of rocks (Igneous Petrology): Acidic Igneous rock: (Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite and Volcanic Tuff) Basic rock: (Gabbro, Dolerite, Basalt and its varieties, Trachyte.)</p> <p>3. Sedimentary Petrology - Study and classification of secondary and sedimentary rocks. Study and characteristic of secondary rocks. Study and identification of following secondary rocks. Identification of rocks (Sedimentary Petrology): Laterite, Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.</p> <p>4. Metamorphic Petrology - Study and types of structures of metamorphic rocks. Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.</p> <p>5. (4 Maps) Study of topographical features from Geological maps. Identification of symbols in maps. Study of geological maps and drawing vertical section of map no.1 (simply dipping beds). Study of map no.4 to map no.7-study of five geological maps with simply dipping, with strike fault, with dip fault and with engineering problems related to selection of dam site, location of tunnel, stability of hill slopes. Drawing and vertical geological sections of each step.</p>	
The assessment of term work shall be done on the basis of the following.		
<ul style="list-style-type: none">• Continuous assessment• Performing the experiments in the laboratory• Oral examination conducted on the syllabus and term work mentioned above.		




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Course Code: BSC254 Course: Lab-IV: Development of Skills Practical: 02 Hrs/week	Credits: 0-0-1 Teacher Assessment: 25 Marks End Semester Examination (Online): 25 Marks
Prerequisite	Knowledge of English and general knowledge
Objectives	<ol style="list-style-type: none">1. Students will be able to communicate in English accurately and effectively.2. Students will be able to enhance employability skills.3. Students will be able to participate in debate and group discussion in English effectively.4. Students will be able to enhance verbal ability.5. Students will be able to face interview effectively.
Unit-I	Common Errors in English Communication <ul style="list-style-type: none">• Grammatical• Spelling• Pronunciation(2 Hrs)
Unit-II	Enhancing Employability skills <ul style="list-style-type: none">• Job application• Resume / CV• Essay• Reading Comprehension (6 Hrs)
Unit-III	Debate and Group Discussion <ul style="list-style-type: none">• Communication• Appearance• Preparation (4 Hrs)
Unit-IV	Verbal Ability-I <ul style="list-style-type: none">• Synonyms• Antonyms• Idioms and Phrases (4 Hrs)
Unit-V	Verbal Ability-II <ul style="list-style-type: none">• One word substitution• Word analogy (4 Hrs)
Unit-VI	Interview Skills <ul style="list-style-type: none">• Body language• Grooming• Preparation (4Hrs)



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Textbooks/ Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Verbal and Non-Verbal Reasoning	R.S. Agrawal	S. Chand Publication	2018
	2.	Effective Technical Communication	Anne Eisenberge	Mc Graw Hill International Editors	1982
	3.	Professional Communication Skills	A. K. Jain, Pravin, S. R. Bhatia, A. M. Sheikh	S. Chand & Company Ltd.	2001
	4.	Business Communication	Urmila Rai, S. M. Rai	Himalaya Publishing House	2011
	5.	Better English Pronunciation	J.D. O'Connor.	Cambridge University Press	1980
	6.	Grammar of Spoken and Written English	DauglasBiber, Geoffrey Leech	Longman	1999
	7.	Technical Communication-Principles and Practice	Meenakshi Raman & Sangeeta Sharma	Oxford University Press	2004
	8.	A course in Phonetics & Spoken English	J. Sethi, P.V. Dhamija	PHI publication	2006
	9.	Communication Skills for Engineers	Sunita Mishra, C. Murli Krishna	Pearson Education	2011
	10.	Soft Skills: Enhancing Employability: Connecting Campus with Corporate	M.S. Rao	I.K. International	2013
	11.	Technical Communication A Reader Centered Approach	Paul V. Anderson	Thomson Publication	2007
	12.	Oxford English Grammar	Sydney Greenbaum	Oxford University Press	1996


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Course Code: CED278 Course: Lab V: Problem Based Learning Teaching Scheme: Practicals: 2 Hrs/week	Credits: 0-0-1 Teacher's Assessment: 25 Marks
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Pre-requisite	Basic understanding of Engineering concepts and practices.
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Objectives	On completion of the course, learner will be able to – <ul style="list-style-type: none">• To develop positive attitude, new skills, or new ways of thinking.• To introduce independent and group learning by solving real world problem with the help of available resources.• To be able to develop systematic approach in technical documentation.• To select and utilize appropriate Software tools/Equipment/Problem solving tools to solve real life problems.
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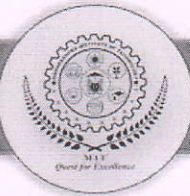
Guidelines: The students plan, manage and complete a activity which addresses the stated problem.

1. The students must work in group of 3 to solve real life problem.
2. Open ended problems from course teachers can be considered from any course related to engineering field. (It can be domain specific/multidisciplinary but the emphasis on Mechanical Engineering)
3. A mentor to be assigned to 3-4 groups / one batch.
4. The steps to be followed for problem-based learning are as mentioned below:

	Issues	Action
1	Explore the issue	Gather necessary information; learn new concepts, principles, and skills about the proposed topic.
2	Identification of problem	Identification of the problem from the sources explored
3	Formulating the problem	Frame the problem in a context of what is already known and information the students expect to learn.
4	Researching the sources for probable solutions	Find resources and information that will help create a compelling recourses to look out for the solutions
5	Investigate solutions	List possible actions and solutions to the problem, formulate and test potential hypotheses
6	Review the solutions	Students must evaluate their performance and plan improvements for the next problem

Steps involved in Problem based learning:

1. Exploration : searching and identifying of all domains of knowledge to look out for problems
2. Identification of problem
3. Formulating the problem
4. Researching the sources for probable solutions



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5. Investigation of the solutions (generation of solutions)
6. Review the solutions
- 7.

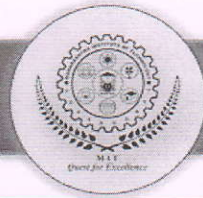
Evaluations and weight age

1	Identification of the Problem	20%
2	Documentation	30%
3	Demonstration	20%
4	Awareness /Consideration of - Environment/ Social /Ethics/ Safety measures/Legal aspects	10%
5	Outcome	20%
	Total	100%

	Sr. No.	Title	Author	Publication	Edition
Text books and References	1.	A new model of problem-based learning	Terry Barrett	All Ireland Society for Higher Education (AISHE)	2017
	2.	Research Methodology: Methods and Techniques C. R. Kothari	C. R. Kothari	New Age International Publishers;	Fourth edition, 2019

- 1 Problem based learning: <https://www.coursera.org/lecture/universityteaching/problem-based-learning-i-pbl-in-practice-SMXol>
- 2 Problem-Based Learning: https://onlinecourses.swayam2.ac.in/ntr20_ed29/preview


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Course Code: HSM805 Course: Professional Ethics and Corporate Social Responsibility (Mandatory Non-Credit course)		Credits: 0-0-0
Teaching Scheme: Theory: 02 Hrs/week		
Objectives	1. To develop understanding of professional ethics in different organizational context. 2. To identify, analyze, and resolve ethical issues in business decision making. 3. To develop various corporate social Responsibilities and practice in the professional life	
Unit-I	Professional Ethics and Business: The Nature of Business Ethics; Ethical Issues in Business; Moral Responsibility and Blame; Utilitarianism: Weighing Social Costs and Benefits; Rights and Duties of Business. (4 Hrs)	
Unit-II	Professional Ethics in the Marketplace: Perfect Competition; Monopoly Competition; Oligopolistic Competition; Oligopolies and Public Policy Professional Ethics and the Environment: Dimensions of Pollution and Resource Depletion; Ethics of Pollution Control; Ethics of Conserving Depletable Resources. (4 Hrs)	
Unit-III	Professional Ethics of Consumer Protection: Markets and Consumer Protection; Contract View of Business Firm's Duties to Consumers; Due Care Theory; Advertising Ethics; Consumer Privacy. (4 Hrs)	
Unit-IV	Introduction to Corporate Social Responsibility: Corporate Social Responsibility: Concept, Scope & Relevance and Importance of CSR in Contemporary Society. CSR and Indian Corporations- Legal Provisions and Specification on CSR, A Score Card, Future of CSR . (4 Hrs)	
Unit-V	Potential Business Benefits—Triple bottom line, Human resources, Risk management, Supplier relations; Criticisms and concerns—Nature of business; Motives; Misdirection. (4 Hrs)	



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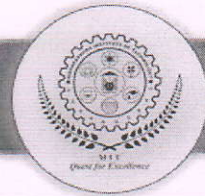
Text books and References	Sr. No.	Title	Author	Publication	Edition
	1.	Business Ethics: Texts and Cases from the Indian Perspective	Ananda Das Gupta	Springer	2014
	2.	Business Ethics: Concepts and Cases	Manuel G. Velasquez.	Pearson	2014
	3.	Corporate Social Responsibility: Readings and Cases in a Global Context	Andrew Crane, Dirk Matten, Laura Spence;	Routledge	2013
	4.	Corporate Social Responsibility in India	BidyutChakrabarty	Routledge	2015


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Course Code: HSM806 Course: Emotional Intelligence (Mandatory Non-Credits course) Teaching Scheme: Theory: 02 Hrs/week		Credits: 0-0-0			
Objectives	1. To interpret and manage emotions. 2. To learn the four core skills required to practice emotional intelligence. 3. To relate emotional intelligence to the workplace.				
Unit-I	Introduction to emotion, Development of emotions and emotional maturity, intelligence & wisdom, Science of Emotional Intelligence, EQ and IQ (4 Hrs)				
Unit-II	Concept, theory, measurement and applications of intelligence, Dimensions of Trait EI Model: Self-awareness, Self-regulation, Motivation, Empathy, Social skills. (4 Hrs)				
Unit-III	Emotional intelligence: concept, theory and measurements, Correlates of emotional intelligence (4 Hrs)				
Unit-IV	Emotional intelligence, culture, schooling and happiness, Emotional Intelligence at Work place: Importance of Emotional Intelligence at Workplace? Cost-savings of Emotional Intelligence. (4 Hrs)				
Unit-V	For enhancing emotional intelligence EQ mapping, Managing stress, suicide prevention, through emotional intelligence, spirituality and meditation. (4 Hrs)				
Unit-VI	Application of emotional intelligence at family, school and workplace, Case Studies Measuring Emotional Intelligence: Emotionally Intelligence Tests.(4 Hrs)				
Text books and References	Sr. No.	Title	Author	Publication	Edition
	1.	Emotional Intelligence- Why it can Matter More than IQ	Daniel Goleman	Bantam Doubleday Dell Publishing Group	1996
	2.	Working with Emotional Intelligence	Manuel G. Velasquez.	Bantam Doubleday Dell Publishing Group	2000



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	3.	Emotional Intelligence Coaching	Liz Wilson, Stephen Neale & Lisa Spencer-Arnell	Kogan Page India Private Limited	2012
	4.	Corporate Social Responsibility in India	Bradberry, Travis and Jean Greaves	Perseus Books Group	2009


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Course Code: HSM807		Credits: 0-0-0			
Course: Stress Management Through Yoga (Mandatory Non-Credit course)					
Teaching Scheme: Theory: 02 Hrs/week					
Objectives	1. To identify common stressors inherent in today's global marketplace. 2. To develop an understanding of the impact of stress on physiological, emotional and cognitive processes. 3. To learn to manage the stress through art of Yoga				
Unit-I	Mental Health: Meaning and Importance; Yogic Perspective of Mental Health, Indicators of Mental Health, Stress: Meaning and Definition; Symptoms, Causes and Consequences of Stress, Meaning of Management – Stress Management, Stress in Modern Culture & Society. (6 Hrs)				
Unit-II	Concept of Stress according to Yoga, Assessing your Stress & Building Resilience. (3 Hrs)				
Unit-III	Physiology of Stress on: Autonomic Nervous System (ANS), Endocrine System, Hypothalamus, Cerebral Cortex and Neurohumours. (3 Hrs)				
Unit-IV	Mechanism of Stress related diseases: Psychic, Psychosomatic, Somatic and Organic phase. Role of Meditation & Pranayama on stress - physiological aspect of Meditation, Constant stress & strain, anxiety. (4 Hrs)				
Unit-V	Meaning and definition of Health: various dimensions of health (Physical, Mental, Social and Spiritual) - Yoga and health -Yoga as therapy. Physical fitness. Stress control exercise - Sitting meditation, Walking meditation, Progressive muscular relaxation, Gentle stretches and Massage. (5 Hrs)				
Unit-VI	Preventive and curative effects of Yoga on stress related disorders: Hypertension, Heart problems, Bronchial Asthma, Peptic Ulcer, Diabetes Mellitus, Arthritis, Anxiety Neurosis and Headache (3 Hrs)				
Text books and References	Sr. No.	Title	Author	Publication	Edition
	1.	Stress Control for peace of Mind	Linda Wasmer Andrews	Main Street	2005
	2.	Yoga for stress	Vimla Lalvani	Hamlyn	1998
	3.	Yoga perspective in stress management	H.R. Nagendra, and R. Nagarathana,	Swami Vivekananda Yoga Prakashana	2004
	4.	Yoga practices for anxiety & depression	H.R. Nagendra, and R. Nagarathana,	Swami Sukhabodhanandha Yoga Prakashana	2004
5.	Stress management by Yoga	K.N. Udupa,	MotilalBanaridass Publishers Private Limited.	1996	