Bharati Vidyapeeth (Deemed To Be University), Pune
Faculty of Engineering and Technology
Programme: B. Tech. (Civil) –CBCS 2021 Course

Program: B. Tech. Civil **Sem: III** **CBCS2021 Course**

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	UE	IA	TW	TW & OR	TW & PR	Total	L	P TW/OR/PR	T	Total
1.		Mechanics of Solids	3	2	1	60	40	25	-	-	125	3	1	1	5
2.		Construction Equipment & Methods	4	2	-	60	40	25	-	-	125	4	1	-	5
3.		Fluid Mechanics	4	2	-	60	40	-	50	-	150	4	1	-	5
4.		Economics & Finance	3	-	-	60	40	-	-	-	100	3	-	-	3
5.		Concrete Technology*	4	2	-	60	40	-	50	-	150	4	1	-	5
6.		Vocational Course-I : Computer Aided Building Planning and Design (Revit,BIM)	-	-	-	-	-	-	50	-	50	-	2	-	2
7.		Civil Engineering Software – II (AutoCAD 3D)	-	4	-	-	-	-	75	-	75	-	2	-	2
8.		Data Analytics Using Python	-	2	-	-	-	25	-	-	25	-	1	-	1
9.		MOOCs-I	-	-	-	-	-	-	-	-	-	-	-	-	2
	Total		**18**	**14**	**1**	**300**	**200**	**75**	**225**	**-**	**800**	**19**	**08**	**1**	**30**
	Environmental studies**		-	-	-	100	-	-	-		-	-	-	-	-

*Industry Taught Course – I
**Mandatory Audit course with 100 marks end semester examination

Bharati Vidyapeeth (Deemed To Be University), Pune
Faculty of Engineering and Technology
Programme: B. Tech. (Civil) –CBCS 2021 Course

Program: B. Tech. Civil **Sem: IV** **CBCS2021 Course**

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	UE	IA	TW	TW & OR	TW & PR	Total	L	P TW/OR/PR	T	Total
1.		Vector Calculus and Differential equations	3	-	-	60	40	--	--	--	100	3	--	--	3
2.		Open Channel flow and Hydraulic Machinery	4	2	-	60	40	--	50	--	150	4	1	--	5
3.		Geomechanics	4	2	--	60	40	--	50	--	150	4	1	-	5
4.		Analysis of Determinate Structures	3	-	1	60	40	--	--	--	100	3	-	1	4
5.		Planning & Management of Construction Projects*	4	2	-	60	40	--	50	--	150	4	1	-	5
6.		Vocational Course-II :Plumbing Engineering	--	--	-	-	-	--	50	--	50	--	2	-	2
7.		Construction Practices in Civil Engineering	-	4	-	-	-	50	--	--	50	--	2	-	2
8.		Civil Engineering Software – III (Hecras)	--	4	--	-	-	--	50	--	50	-	2	-	2
9.		Social Activity- I	--	--	--	-	-	--		--	--	-	-	-	2
		Total	**18**	**14**	**1**	**300**	**200**	**50**	**250**		**800**	**18**	**9**	**1**	**30**
		Disaster Management **				**100**									

*Industry Taught Course – II
**Mandatory Audit course with 100 marks end semester examination

Programme: B. Tech. (Civil) Sem – III (2021)

COURSE: MECHANICS OF SOLIDS

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 03 Hours / Week Tutorial: 01 Hour / Week	Semester End Examination: 60 Marks Internal Assessment: 40 Marks	Theory: 03 Tutorial: 01
Practical: 02 Hours / Week	Term Work: 25 Marks	TW :01

Course Pre-requisites: The students should have knowledge of	
1	Statics and Dynamics
2	Mathematics-Algebra, Geometry, Concept of differentiation and integration
Course Objective:	
	The student should be able to calculate stresses developed in the material.
Course Outcomes: The student will be able to	
1	determine axial stresses in the member.
2	draw shear force and bending moment diagram for determinate beams.
3	calculate bending stresses and deflection of beam.
4	calculate shear stresses due to shear force and torsion.
5	calculate critical load on column.
6	compute principal stresses using analytical and graphical method.

Course Content:

Unit-I	**Simple Stresses and Strains** Concept of stress and strain: Normal, lateral, shear and volumetric stresses and strains, Stress-strain curve; Elastic constants and their inter relationship; Generalized Hooke's law; Stresses due to Axial Load and Temperature: Axial force diagram; Stresses, strains and deformation of determinate and indeterminate bars of prismatic, homogenous and composite cross section	**(06Hrs)**
Unit-II	**Shear Force and Bending Moment Diagram** Concept of Shear Force and Bending Moment; Relation between Shear Force, Bending Moment and intensity of loading; Shear Force Diagram and Bending Moment Diagram of determinate beams due to concentrated load, uniformly distributed load, uniformly varying load and moments Bending moment and loading diagram from given shear force diagram.	**(06 Hrs)**
Unit-III	**Bending Stresses and Deflection of Beam** Bending Stresses: Theory and assumptions of pure bending; Moment of resistance; Flexure formula; Flexural rigidity; Modulus of rupture; Flexural stress distribution diagram for various sections; Force resisted by partial cross section. Deflection of Beams: Concept of relation between deflection, slope, bending moment, shear force and intensity of loading; Macaulay's method, Elastic curve.	**(06 Hrs)**

Unit-IV	**Direct and Torsional Shear Stress** Shear Stresses: Concept of direct and transverse shear; Shear stress formula; concept of complementary shear stress; Shear stress distribution diagram for symmetrical and unsymmetrical section Torsion of Circular Shafts: Theory, assumptions and derivation of torsional formula; Shear stress distribution across cross section; Twisting moment diagram; Shear stresses and strains in solid, hollow, solid, homogeneous and composite cross sections subjected to twisting moment.	**(06 Hrs)**
Unit-V	**Combined Stresses and Axially Loaded Column** Direct and bending stresses for eccentrically loaded short column, Resultant stress diagrams due to axial loads, uni-axial, and bi-axial bending. Concept of core of section for solid and hollow rectangular and circular sections. Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formula, safe load on column and limitations of Euler's formula	**(06 Hrs)**
Unit-VI	**Principal Stresses and Principal Planes** Normal and shear stresses on any oblique plane. Concept of principal stresses and principal planes. Maximum shear stress; Analytical and graphical method (Mohr's circle method); Combined effect of axial force, bending moment, shear force and torsion.	**(06 Hrs)**

Internal Assessment:		
Unit Test -1	UNIT – I, II, III	
Unit Test -2	UNIT – IV,V,VI	

Assignments: Students should complete assignments from	
1	Calculate the different stresses for determinate and indeterminate members.
2	Draw the shear force and bending moment diagram for different types loading acting on simply supported, compound and cantilever beam.
3	Draw the bending stress distribution diagram for different cross section.
4	Determination of slope and deflection of beam for various types of loading acting on beam.
5	Draw the shear stress distribution diagram for different cross section.
6	Calculate load carrying by column by using Euler's and Rankine Theory.
7	Calculate principal stress, normal and tangential stress by analytical and graphical method.

Term Work: The term-work shall consist of Minimum **Eight experiments** from list below.	
1	Tension test on mild steel
2	Tension test on tor steel
3	Direct Shear (Single & Double) test on mild steel
4	Bending test on timber
5	Torsion test on mild steel

6	Impact tests (Izod & Charpy) - Mild Steel, Aluminium, Brass, Copper
7	Hardness test (Rockwell)- mild steel, aluminium, brass copper
8	Compressive Strength of brick
9	Construction of Mohr's Circle for calculation of principal stresses.
10	Development of an excel sheet for calculation of stresses at a point in cross section for given loadings.
11	Development of an excel sheet for calculation of principal stress at a point.
Reference Books:	
1	Beer F.P. and Johnston E.R., "Mechanics of Materials", McGraw Hill Publication
2	Singer F. L. &Pytel A., "Strength of Materials", Harper and Row Publication
3	Gere J.M. & Timoshenko S.P., "Mechanics of Materials", CBS Publishers & Distributors
4	Bansal R.K., "Strength of Materials", Laxmi Publications.
5	Ramamrutham S. "Strength of Materials" Dhanapat Rai Publications.
6	Bhavikatti S.S "Strength of Materials", New Age Publications

Topics for project based Learning for Mechanics of Soilds
1. Draw the stress strain curve of mild steel and tor steel by using excel.
2. Collect the IS code related to testing of material and specifications for any five materials.
3. Prepare the chart for various types of stresses and strain with suitable example.
4. Development of an excel sheet for calculation of Elastic constants, Thermal stresses with suitable example.
5. Market survey for structural materials (at least ten materials)
6. Prepare the chart for Shear force and bending moment diagram for simply supported beam (At least Five problems with different types of loading)
7. Prepare the chart for Shear force and bending moment diagram for Cantilever beam (At least Five problems with different types of loading).
8. Prepare the chart for Shear force and bending moment diagram for overhanging beam (At least Five problems with different types of loading)
9. Development of an excel sheet for calculation of bending stresses for different sections. (At least three problem)
10. Prepare the chart for derivation of flexural formula and bending stress distribution diagram for different section.
11. Prepare the chart for deflection and slope of simply supported beam (at least five problems with different types of loading)
12. Prepare the chart for deflection and slope of cantilever beam (at least five problems with different types of loading)
13. Prepare the chart for derivation of shear stress formula and shear stress distribution diagram for different section.
14. Prepare the chart for derivation of torsional formula.
15. Development of an excel sheet for calculation of direct and bending stress in section. (At least three problem)
16. Prepare the chart for core section (square, rectangular, circular, hollow rectangular and hollow circular).
17. Development of an excel sheet for load carrying capacity of column by using Euler's theory. (At least three problem)
18. Collect the photographs along with justification of (a) failure of short and long column (b) Failure of beam in bending and shear.
19. Draw the Mohr's circle (at least five problems)

20. Prepare the chart for Calculation of normal and shear stress by using graphical method.

Programme : B.Tech. (Civil) Sem. – III (2021)

Course: Construction Equipment & Methods

TEACHING SCHEME:	**EXAMINATION SCHEME:**		**CREDITS: 05**
Theory: 04 Hours / Week	Semester End Examination:	60 Marks	Theory: 04
	Internal Assessment:	40 Marks	
Practical: 02 Hours / Week	Term Work:	25 Marks	Term Work: 01

Course Pre-requisites: The students should have knowledge of

1 Building Construction Practices, Building Planning & Design.
2 Engineering Economics.
3 Concrete Technology.

Course Objective:

Students should get knowledge of Construction Operation Equipment & different methods of advanced construction techniques, tunneling, concreting & dewatering.

Course Outcomes: The student will be able to

1 explain various advanced construction techniques.
2 apply different construction techniques for underwater construction.
3 identify and find output of earth moving equipment.
4 describe hoisting & conveying equipment.
5 Understand equipment key features, cost and find out its performance.
6 describe dewatering, paving equipment & concrete pumps

Course Content:

Unit-I **Advanced Construction Techniques:** **(08 Hrs)**

Construction - Light, Medium & Heavy duty. Launching of Girders, Precast Techniques, Tunnel Driving techniques, Tunnel boring machines (Open & Shield), Road Headers & Boomers, Shotcreting & Gunieting. Trenchless Technology, Micro Tunneling. Pneumatic Drilling equipments. Drill & Blast method.

Unit-II **Under Water Construction:** **(08 Hrs)**

Cofferdams Dams & Caissons – Definition, Classification & its use. Dredging Techniques. Construction under deep water (Tremie Method).
Classification & different types of Piles, Sheet Piles, Pile driving techniques, Negative skin friction. Use of special types of Formwork. Jetties.

Unit-III **Earth Work Machineries:** **(08 Hrs)**

Fundamentals of Earth work operations. Earth Moving Operations - Types of Earth Work Equipment -Tractors, Motor Graders, Scrapers, Front end loaders – Dozer, Excavators, Rippers, Front Shovel, Back Hoe, Loaders, trucks, dumpers and hauling equipment, Compacting Equipment - Tamping Rollers, Smooth Wheel Rollers, Sheepsfoot Roller, Pneumatic-tyred Roller, Vibrating Compactors, Vibrocompaction methods. Finishing equipment.

Unit-IV **Hoisting & Conveying Equipments:** **(08 Hrs)**

Hoisting & Transporting equipment; types (Derrick, Tower & Mobile), factors affecting for selection. Conveying equipments-: belt, apron, vibrating, pneumatic, flight & spiral or screw conveyors. Hauling

equipments. Crushers & its types.

Unit-V **Equipment Management & Economics:** **(08 Hrs)**

Planning Process of Equipment. Identification – Selection of Equipment - Maintenance Management. Cost Control of Equipment. Safety Management, Equipment cost -: Ownership cost, Operating Cost, Equipment Life and Replacement Analysis. Depreciation Analysis, Safety Management of equipments.

Unit-VI **Dewatering, Paving Equipments & Concrete Pumps:** **(08 Hrs)**

Dewatering Techniques; Electro-osmosis method, Well Point System, Paving Equipments; Types, Uses. Asphalt Pavers, Slip Form Pavers, Concrete Pavers. Pumps; Types & Uses. Pumps for concreting.

Internal Assessment:

Unit Test -1	UNIT – I, II, III
Unit Test -2	UNIT – IV,V,VI

Assignments –

1. Write short notes on -:
    a) Shotcreting
    b) Gunieting
    c) Trenchless technology
    d) Drill & Blast method
    e) Pneumatic drilling equipments

2. Define & differentiate between Cofferdams & Caissons & briefly explain piles & its Classification.
3. List out difference between crawler and pneumatic type of wheels?
4. Compare belt conveyor with other types of conveyors?
5. What are the various equipments used for compacting? Explain them.
6. Explain launching of girders.
7. What are the different types of equipments used for trenching and tunneling?
8. What is Well point system?
9. Describe various methods for tunneling in hard rocks.

Term work - :

1. Collection of pamphlets and information regarding various construction techniques equipment (Information pertaining to the following aspects should be collected)
    i. Types, Different makes of the equipment
    ii. Useful Life and area of use
    iii. Equipment performance data

2. In context of tunneling, enlist and explain different tunnel driving techniques & tunnel boring machines.

3. Classify, discuss briefly various earth work machineries (any five) & factors affecting in selection including their economics.
4. Classify & explain various hoisting & conveying equipment. Discuss in detail about factors affecting in selection of them & its economics.
5. Explain crushers & its types in detail.
6. Enlist & explain with neat diagrams, different dewatering techniques (electro-osmosis method, well point system).
7. Write a brief note on Pumps & its types. Discuss in detail about various pumps used for concreting.
8. Prepare a Power Point presentation (P.P.T.) on any of the topic of your choice from the entire syllabus after getting approval of topic from your subject teacher.

9. Site Visit report to be prepared after visiting the site covering topics mentioned in syllabi.

Textbooks -:

1. Peurifoy, R., Schexnayder, C., Shapira, A., & Schmitt, R. (2011). "Construction Planning, Equipment, and Methods" (8th ed.). McGraw-Hill.
2. Gransberg, D. D., Popescu, C. M., & Ryan, R. C. (2006). "Construction equipment management for engineers, estimators, and owners" (2nd edition). CRC Press.

Reference Books:

1. Mahesh Verma, "Construction Equipment & Planning & Application", Metropolitan Book Company Private Ltd., New Delhi.
2. Peurifoy Robert L., William B. Ledbetter, "Construction Planning Equipment Methods", McGraw Hill Book Company.
3. Russel James E., "Construction Equipment", Reston Publishing Company.
4. Shetty M.S., "Concrete Technology – Theory & Practice", S. Chand & Company Private Limited.
5. S.C. Sharma & Khanna, Construction Equipments & its Management",
6. V.R. Phadke "Construction Machinery & Works Management".
7. Day, D. A., & Benjamin, N. B. H. (1991). "Construction equipment guide" (2nd edition). John Wiley & Sons.
8. Harris, F. (1994). "Modern construction and ground engineering equipment and methods" (2nd ed.). Pearson Longman.
9. Nunnally, S. W. (2011). "Construction methods and management" (8th edition.). Prentice Hall.

Project Based Learning topics - :

1. Construction Technology used in defense war fields.
2. Low cost housing - Construction of a low cost house.

3. Tunnel design.
4. Use of dampers in high rise buildings
5. Construction of Overhead Bridge process. (Case study).
6. The invention of slip form technique and cost savings (case study).
7. PILE Construction Technique.
8. Construction techniques used in Empire State Building and Burj Khalifa.
9. For the construction project what capital cost has to be taken in consideration (Case study)?
10. List out some of the software used in the construction sector to estimate cost and monitoring expenses of machineries and perform one application of it on construction site/project?
11. What are the health and safety duties in relation to concrete pumping work? What is to be involved in managing risks associated with concrete pumping?
12. What are the parameters for Selection of Tunneling Method and Parameters Effecting Ground Settlements
13. How to choose the right conveyor system? How much do conveyor systems cost?
14. Why is electro-osmosis (dewatering) so effective in clayey and heterogeneous soils. Explain with a case study?
15. Explain methods of launching girders at a metro rail site in India.
16. How do real estate development and precast concrete elements fit together? Are there any limitations regarding the construction of houses?
17. Construction of Emergency Temporary structures and facilities (Jumbo COVID hospital etc.).
18. What are the hazards associated with construction of cofferdam?
19. What are the different methods of blasting?
20. Explain Mechanical Dredging Operations for Removal of Reservoir Sediment.

Programme: B. Tech (Civil) Sem – III (2021)

COURSE: FLUID MECHANICS

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 04 Hours / Week	Semester End Examination: 60 Marks Internal Assessment: 40 Marks	Theory: 04
Practical: 02 Hours / Week	Term Work & Oral : 50 Marks	Term Work & Oral: 01

Course Pre-requisites: The students should have knowledge of	
1	Engineering Mathematics
2	Engineering Physics
Course Objective:	
	To make the student understand the scope and application of Fluid Mechanics
Course Outcomes: The student will be able to	
1	describe basic properties of fluids and measure its properties in static conditions
2	apply knowledge of fluid kinematics and dynamics conditions.
3	analyse physical phenomenon dimensionally
4	explain laminar flow and flow through pipes.
5	explain of boundary layer theory.
6	describe turbulent flow

Course Content:

Unit-I	**Properties of Fluids & Statics** : Scope and application of fluid mechanics, Physical properties of fluids, Newton's Law of Viscosity, Dynamic & Kinematic Viscosity, Classification of fluids. Statics: Pressure density height relationship & Measurement, Hydrostatic pressure on a plane, Centre of pressure, Buoyancy, Stability of floating bodies, Metacentre and Metacentric height.	**(08 Hrs)**
Unit-II	**Kinematics** Types of flow, path lines and streak lines, stream lines, Stream Tube, Continuity Equation in 1-D and 3-D, Velocity potential, Stream functions, Circulation and Vorticity, Concept and Application of Flow Net.	**(08 Hrs)**
Unit-III	**Energy Relationships** Derivation of Bernoulli's Equation from Newton's 2nd Law , Limitations, Modified form of Bernoulli's Equation, Total energy and Hydraulic Grade line, Impulse momentum equation..	**(08 Hrs)**
Unit-IV	**Dimensional Analysis and Model Studies** Dimensional homogeneity, important dimensionless parameters, Dimensional analysis using Buckingham's theorem, Model studies, Similitude, Model laws, Types of models.	**(08 Hrs)**
Unit-V	**Fundamental of Pipe Flow & Boundary layer theory** Reynolds experiment, Classification of Flows based on Reynolds Number, Moody's Diagram, Laminar flow in circular pipe, Hagen Poisullies Equation, Introduction to Boundary Layer Theory, Concept of boundary layer, Development of Boundary layer over a flat plate, Laminar and transitional boundary layer, laminar sub layer, General characteristic of	**(08 Hrs)**

	boundary layer, Boundary layer thickness, Velocity distributions within boundary layer		
Unit-VI	**Turbulent flow & Pipe Flow Problems** Characteristics of turbulent flow- Instantaneous velocity, Temporal mean velocity, Scale of turbulence and intensity of turbulence, Darcy- Weisbach equation, Flow through pipes: Energy losses in pipe flow, parallel and series pipes, Equivalent Pipe Concept, Pipe network Analysis, Siphons, Hydraulic transmission through pipes, three reservoir problems.		**(08 Hrs)**
Internal Assessment:			
	Unit Test -1	UNIT – I, II, III	
	Unit Test -2	UNIT – IV, V, VI	
Assignments: Students should complete assignments from			
1	Solution of numerical problems asked in recent three years of BVU question papers.		
2	Solution of questions asked in recent three years BVU question papers		
3	Report of new topic being discussed in reputed research journals related to fluid mechanics		
4	Mini projects such as collection of information, Brochure, Data, on a topic related to fluid mechanics.		
5	Writing of industrial applications of various topics of syllabus.		
6	Design of new experiments related to fluid mechanics.		
7	Collection of two fluid mechanics NPTEL videos and demonstration of it.		
8	Collection of information about fluid mechanics equipment's /machinery/materials related to fluid mechanics.		
9	Collection of information about fluid mechanics phenomenon and its explanation.		
10	Collection of data of different fluids with reference to their properties.		
Term Work: The term-work shall consist of Minimum **Eight**experiments from list below.			
1	Determination of Viscosity		
2	Study of Pressure Measuring Devices		
3	Study of Stability of Floating Bodies		
4	Verification of Bernoulli's Theorem.		
5	Calibration of C_d of Venturimeter		
6	Calibration of C_d of Orifice		
7	Calibration of C_d Notch		
8	Study of Laminar flow Using Heleshaw's Apparatus		
9	Study of Laminar flow Using Reynold's Apparatus		
10	Design of Venturimeter (As per IS Code)		
11	Design of Weir (As per IS Code)		
Oral: The Oral examination will be based on above term work and course content.			
Reference Books:			
1	Garde R. J. and Mirajgaonkar "Engineering Fluid Mechanics" ScitechPulication		
2	C.P.Konthadraman "Fluid Mechanics And Machinery" New Age Publications		
3	S. Ramamurtham "Hydraulics and Fluid Mechanics and Fluid Machines" Dhanpat Rai Publishing Company		
4	R. K. Bansal "Fluid Mechanics and Hydraulic Machines" Laxmi Publications		
5	R.K. Rajput "Fluid Mechanics" S Chand Publications		

6	Garde R. J. and Mirajgaonkar “Fluid Mechanics Through Problems” , New Age International New Delhi
7	Modi P.N. and Seth S.M. “ Fluid Mechanics” Standard Book House
Topics for Project Based Learning for Fluid Mechanics	
1	Determining physical properties of 3 different Fluids. (Specific Weight, Mass Density, specific volume , specific gravity)
2	Determining kinematic viscosity at different temperatures of 3 different fluids (Lubricating oils, Cooking oil,)
3	Collection of Newtonian fluid, non Newtonian Fluid, Ideal Plastics and Thixotropic Fluids one each and studying properties of fluids.
4	Based on pressure density height relationship, prepare a sheet showing water pressure on wall of dam of different heights.
5	Prepare a model of a ship showing different Metacentric heights
6	Prepare a model ship showing stable, unstable equilibrium (C.G. and C.P.)
7	Demonstrate and verify Bernoullies theorem using other equipments (Wind Tunnel, etc.)
8	Collection of information and presentation of working of any hyudraulic equipment (JCB, Earth moving machinery etc.)
9	Calculation of Energy losses in pipe flow for different flow conditions.
10	Calculation of Coefficient of discharge of Venturimeter by taking 10 different flow readings.
11	Calculation of Coefficient of velocity of Venturimeter by taking 10 different flow readings.
12	Calculation of Coefficient of discharge of Notch by taking 10 different flow readings.
13	Preparing different shaped acrylic notches to measure discharge and calibrating it.
14	Calculate Energy losses in domestic pipe line with given data.
15	Preparing a acrylic model for a dam and testing it.
16	Find Metacentric Height of body containing liquid. Discuss the difference with reference to normal case.
17	Prepare a model Orifice Meter device in a UPVC pipe length.
18	Prepare a model of U Tube manometer
19	Prepare a model of U Tube inclined Manometer
20	Prepare a model of U Tube Micromanometer

Programme: B. Tech (Civil) Sem – III (2021)

COURSE: ECONOMICS & FINANCE

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 03 Hours / Week	Semester End Examination: 60 Marks Internal Assessment: 40 Marks	Theory:03

Course Pre-requisites: The students should have knowledge of

1	Construction Design & Drawing
2	Basic Mathematics

Course Objective:

	To make students understand engineering economics and financial management.

Course Outcomes: The student will be able to

1	explain the concept of Engineering Economics.
2	estimate time value of money.
3	select best project.
4	find out depreciation cost.
5	prepare balance sheet.
6	generate finance for organization.

Course Content:

Unit-I	**Engineering Economics:** Introduction,Definition of Economics, Importance of Engineering economics, basic economics concept-Human wants. Utility, value, cost, price, capital, wealth, equilibrium etc. law of demand, elasticity of demand. The law of supply. Factors influencing production: land, labour, capital and organization	**(06 Hrs)**
Unit-II	**Cash Flow:** Basic principles, time value of money, cash flow diagram. Equivalence single payment in the future, present payment compare to uniform series payment. Future payment compare to uniform series payment.	**(06 Hrs)**
Unit-III	**Project Economics and Analysis:** Comparison of alternatives, net present value present, future and annual worth method of comparing alternatives, internal rate of return. Break even analysis. Benefit cost ratio	**(06 Hrs)**
Unit-IV	**Depreciation and Value Engineering:** Depreciation and methods of depreciations. Inflation, value engineering and value analysis	**(06 Hrs)**
Unit-V	**Financial Management:** Financial management, construction accountancy charts of accounts, financial statement, profit and loss account, balance sheet of construction Industry.	**(06 Hrs)**
Unit-VI	**Project Budgeting**: Types of capitals, fix and working capital, debentures, shares, public deposits. Forms of foreign capital, money and capital market in India. New economic policy. Role of financial institutions in economic development,	**(06 Hrs)**

Internal Assessment:			
	Unit Test -1	UNIT – I, II, III	
	Unit Test -2	UNIT – IV,V,VI	
Assignments: Students should complete assignments from			
1	Preparation of cash flow diagrams and finding out time value of money		
2	Comparison of different projects by different methods		
3	Benefit cost analysis of project		
4	Determination depreciation value of equipment		
5	Preparation of balance sheet for project		
6	Assignment on value analysis		
7	Numerical on engineering economics		
Reference Books:			
1	Blank, L. T. and Tarquin, A. J., "Engineering Economy", Fourth Edition, WCB/McGraw-Hill, 1998		
2	Bose, D. C., "Fundamentals of Financial management", 2nd ed., PHI, New Delhi, 2010.		
3	Boyer, C. B. and Merzbach, U. C., "A History of Mathematics", 2nd ed., John Wiley & Sons, New York, 1989		
4	Gould, F. E., "Managing the Construction Process", 2nd ed., Prentice Hall, Upper Saddle River, New Jersey, 2002.		
5	Gransberg, D. G., Popescu, C. M. and Ryan, R. C., "Construction Equipment Management for Engineers, Estimators, and Owners, CRC/Taylor & Francis, Boca Raton, 2006.		
6	Harris, F. ,McCaffer, R. and Edum- Fotwe, F., "Modern Construction Management", 6th ed., Blackwell Publishing, 2006.		
7	Jha, K. N., "Construction Project Management, Theory and Practice", Pearson, New Delhi, 2011.		
8	Newnan, D. G., Eschenbach, T. G. and Lavelle, J. P., "Engineering Economic Analysis", Oxford University Press, 2010		
9	Ostwald, P. F., "Construction Cost Analysis and Estimating", Prentice Hall, Upper Saddle River New Jersey, 2001		
10	Peterson, S. J., "Construction Accounting and Financial Management", Pearson Education Upper Saddle River, New Jersey, 2005		
Topics for project-based Learning for Economics and finance.			
1. The impact of fiscal deficit on economic performance in developing countries. A case study of India.			
2. The effect of taxation on the Indian economic growth.			
3. Privatization of public enterpriser and its implication on economic policy and development.			
4. The impact of capital market on the economic growth in India.			
5. The role of Indian stock exchange in industrial development.			
6. The impact of foreign direct investment on the Indian economy.			
7. Foreign direct investment and employment generation in India.			

8. The role of small business in poverty alleviation.
9. Demand and its determinants.
10. Working capital management.
11. Infrastructure and economic development.
12. Project on supply and its determinants.
13. Depreciation
14. Project selection methods.
15. Time value of money
16. Financial management.
17. New economic policy of India.
18. Forms of foreign capitals.
19. Instrument in capital market (shares).
20. Money Market.

Programme: B. Tech. (Civil) Sem – III (2021)

COURSE: CONCRETE TECHNOLOGY

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 04 Hours / Week	Semester End Examination: 60 Marks Internal Assessment: 40 Marks	Theory :04
Practical: 02 Hours / Week	Term Work & Oral: 50 Marks	TW & OR: 01

Course Pre-requisites: The students should have knowledge of

1	Building Materials
2	Fundamentals of Civil Engineering

Course Objective:

	The student should know qualities & properties of concrete.

Course Outcomes: The student will be able to

1	test ingredients of concrete
2	measure workability of concrete.
3	measure strength of hardened concrete.
4	describe durability of concrete
5	apply special concreting techniques
6	design of concrete mix

Course Content:

Unit-I	**Constituent of Concrete:** **Cement -** Chemical composition, hydration, heat of hydration, hydrated structure, types of cement, testing of cement as per Indian standard. **Aggregates -** Utility in concrete, classification, effect of geometry & texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading, and grading requirements, sampling & testing as per Indian Standards. **Water -** General Requirements & limiting values of impurities.	**(08 Hrs.)**
Unit-II	**Fresh concrete:** Methods of mixing, transporting, and placing of concrete. Workability – Definition and requirement, factors affecting workability, various tests as per IS and ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, micro-cracking. Admixture for concrete.	**(08 Hrs.)**
Unit-III	**Hardened concrete:** Compressive and tensile strength and their relationship, tests as per IS and ASTM. **Factors affecting strength –** water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate cement-paste inter-face, various finishes of concrete. Introduction to aspects of elasticity, shrinkage, and creep. **Tests for strength of concrete**: Destructive, semi destructive, and non-destructive tests with their limitations, test methods as per IS Code.	**(08 Hrs.)**

Unit-IV	**Durability and permeability of concrete:** Definitions, causes, carbonation, cracking **Concrete in Aggressive Environment:** Alkali – Aggregate Reaction, Sulphate Attack, Chloride Attack, Acid Attack, Effect of Sea Water, Special Coating for Water Proofing, Sulphate Chloride and Acid Attack.		**(08 Hrs.)**
Unit-V	**Special Concrete:** Behavior and characteristics of high strength concrete, High Performance Concrete, Fiber Reinforced Concrete, Mass Concreting, Light Weight Concrete, and Concrete for Precast. **Special concreting techniques:** Pumped concrete, concrete, underwater concrete, pre-placed concrete, vacuum dewatered concrete, hot and cold weather concreting, Ready mixe concrete.		**(08 Hrs.)**
Unit-VI	**Concrete Mix Design:** Principles of Mix Proportioning, Probabilistic Parameters, Factors Governing Selection of mix. IS Method of Concrete Mix Design, Variability of Test Results, Acceptance Criteria, Various IS Code Provisions.		**(08 Hrs.)**
Internal Assessment:			
	Unit Test -1	UNIT – I, II, III	
	Unit Test -2	UNIT – IV, V, VI	
Assignments: Students should complete assignments from			
1	Assignment based on Unit- I		
2	Assignment based on Unit- II		
3	Assignment based on Unit- III		
4	Assignment based on Unit- VI		
5	Assignment based on Unit- V		
6	Assignment based on Unit- VI		
Term Work: The term-work shall consist of from list below.			
A	**Test on Aggregate (Minimum 4)**		
1	Moisture content, Water Absorption		
2	Specific Gravity of Aggregate		
3	Fineness Modulus of Aggregate		
4	Aggregate Impact Test		
5	Aggregate Crushing Test		
6	Flakiness Index, Elongation Index		
B	**Test on Cement (Minimum 3)**		
1	Fineness of Cement		
2	Standard consistency and Setting time of Cement.		
3	Compressive strength of Cement		
4	Soundness of Cement		
C	**Tests on Concrete (Minimum 3)**		
1	Effect of admixture on workability of concrete		
2	Compressive Strength of Concrete		
3	Flexural strength of concrete		

4	Rebound Hammer Test
Oral: The Oral examination will be based on above term work and course content.	
Reference Books:	
1	M S Shetty; 'Concrete Technology', S. Chand Publication New Delhi
2	P Kumar Mehta, 'Monteiro; Concrete Technology', Indian Concrete Institute
3	A. M. Neville; 'Properties of Concrete', Pearson Education
4	A R Santhakumar; 'Concrete Technology', Oxford University Press
5	M L Gambhir; 'Concrete Technology', Tata McGraw Hill
6	IS 456-2000 Indian Standard Plain and Reinforced Concrete - Code of Practice
7	IS 269-1989 Indian Standard Ordinary Portland Cement, 33 Grade — Specification
8	IS 516-1959 Indian Standard Methods of Tests For Strength of Concrete
Topics for Project based learning:	
1.	Market survey, report writing and cost analysis to select types of cements for various construction works.
2.	Site visit to RMC plant (nearby), observations, records and field test of cement.
3.	Conduct various tests as per IS in laboratory on aggregates with reference to syllabus
4.	Site visit to under construction to collect detail information about the ingredients of concrete mix.
5.	Market survey, report writing and cost analysis of Aggregates for various construction works.
6.	Write report on Principal concrete properties affected by the properties of aggregates
7.	Writing complete report and procedure of fresh concrete.
8.	Site visit to nearby RMC plant and draw flow chart.
9.	Conduct various tests on workability of Concrete with reference to syllabus.
10.	Site visit to under construction to observe the quality of fresh concrete.
11.	Market survey of various admixtures used in fresh concrete and writing proper report on each admixture.
12.	Report writing and tests on different grades of concrete.
13.	Report writing and non-destructive tests on hardened concrete of different types.
14.	Preparing Report on all types of Destructive Test conducted in Laboratory.
15.	Report on conducting various tests on Durability and Permeability of Concrete.
16.	Report writing and tests on effect on concrete of Aggressive Environment.
17.	Report on use of different types of admixtures on different grades of concrete.
18.	Site visit and market survey report writing on Special type of Concreting.
19	Report writing on effects of Mix Design on Special Concreting.
20	Preparation of Mix Design for Special Type of Concrete and visiting site and getting all information of mix design used on actual site.

Programme: B. Tech. (Civil) Sem – III (2021)

COURSE: COMPUTER AIDED BUILDING PLANNING AND DESIGN (REVIT, BIM)

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Practical: -- Hours / Week	Term Work & Oral: 50 Marks	TW & OR: 02

Course Pre-requisites: The students should have knowledge of

1	Building Planning and Design
2	AutoCAD 2D

Course Objective:

	The student should be able to prepare building models using Autodesk Revit

Course Outcomes: The student will be able to

1	Prepare Architectural working drawing
2	Draw and modify in Revit Architecture
3	Edit and modify elements using modify tools
4	Prepare models of building components
5	Prepare 3d drawing rendering of 3d models
6	Explain use of Building Information Modelling and Prepare cost estimating

Course Content:

Unit-I	**Introduction to BIM and Autodesk Revit:** Overview of Revit Architecture Interface, Starting Projects, Viewing Commands, Introduction to Architectural working drawing, Representing Standard base 2D drafting	**(8 Hrs)**
Unit-II	**Basic Drawing in Revit:** Drawing Elementary CADD command - Line, Polyline, Polygon, Circle, Polyline, arc, ellipse, Text- Single Text, Multitext, Dtext, Using General Drawing Tools, Editing Elements using tools	**(8 Hrs)**
Unit-III	**Using Modify Tools in Revit:** Using General Drawing Tools, Editing Elements using tools, Working with Basic Modify Tools-Erase, Move, Copy, Mirror, Offset, Scale, Stretch, Chamfer, fillet & explode, Working with Additional Modify Tools	**(8 Hrs)**
Unit-IV	**Modelling in Revit:** Modelling Walls, Doors and Windows, Floors, Stairs, Railing, Preparing utilization of architectural working drawing	**(8 Hrs)**
Unit-V	**Model Rendering:** Practice on 3D drawing & designing, Rendering of 3D model (Light, Material & Landscaping)	**(8 Hrs)**
Unit-VI	**Introduction to BIM:** Software Tools, BIM and Project Delivery, BIM and Cost Estimating	**(8 Hrs)**

Term Work: The term-work shall consist of-

1	Prepare basic 2D plan using Elementary CADD command
2	Creating Sheets and adding floor plans and scaling respectively
3	Prepare different items of building using different materials
4	Prepare Detail layout plan in Revit

5	Creating rendering Images and exporting to JPEG
6	Prepare Cost Estimate for two storey Building
Reference Books:	
1	Daniel John Stine, “Autodesk Revit for Architecture Certified User Exam Preparation (Revit 2019 Edition)”, .
2	Prof. Sham Tickoo, “Exploring Autodesk Revit 2021: For Architects and Building Designers”, BPB Publications.
3	Eddy Krygiel, “Mastering Autodesk Revit Architecture”, Sybex Publication.

Programme: B. Tech. (Civil) Sem – III (2021)

COURSE: CIVIL ENGINEERING SOFTWARE – II (AUTOCAD 3D)		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Practical: 04 Hours / Week	Term Work & Oral: 75 Marks	TW&OR :02

Course Pre-requisites: The students should have knowledge of	
1	Building Planning and Design
2	Proficiency in producing 2D drawings in AutoCAD
Course Objective:	
	The student should be able to prepare 3D models of construction projects
Course Outcomes: The student will be able to	
1	draw various Engineering drawing using AutoCAD 3D
2	draw various 3D elements of a building from 2d profiles.
3	draw various 3D elevation and sections of the building.
4	draw and explain various modelling concepts of building construction and building drawing by using AutoCAD 3D.
5	draw using different types of materials
6	Render 3D models and scale printing of 3D models

Course Content:

Unit-I	**Introduction to 3D Modelling:** Introduction to AutoCAD 3D, Creating solid primitives, Mesh primitives Working in 3D, Commands for Editing in AutoCAD 3D	**(8 Hrs)**
Unit-II	**Modelling Workflow:** Creating models from 2D profiles, Creating composite models	**(8 Hrs)**
Unit-III	**Editing Models:** Adding detail to your solid models, Editing solid models-Walls, Windows, Door etc	**(8 Hrs)**
Unit-IV	**Visualization:** Using visual styles, Using lights for Different view angles	**(8 Hrs)**
Unit-V	**Visualization:** Using materials for different Items- Walls, Flooring, Door, Windows, Paints etc.	**(8 Hrs)**
Unit-VI	AutoCAD 3D Model Rendering Process, Scale Printing of 3D Models in AutoCAD	**(8 Hrs)**

Term Work: The term-work shall consist of -	
1	Preparation of 3D solid Primitives & Mesh Primitives
2	Preparation of 3D models from 2D profiles
3	AutoCAD 3D Drawing of a plan, elevation, and section of small building.
4	Preparation of AutoCAD 3D views of small building.
5	Use of different Materials for Items.
6	3D Model rendering & Scale Printing of models.

Oral: The Oral examination will be based on above term work and course content.	
Reference Books:	
1	Goerge Omura “Mastering AutoCAD 2018 and AutoCAD LT 2018, Sybex
2	James A. Leach “AutoCAD 2018 Instructor perfect paperback,SDC Publications
3	Cheryl R. Shrock “Beginning AutoCAD Exercise workbook 2018,Industrial Press Inc., U.S.
4	James A. Leach , Shawna Lockhart, “AutoCAD 2018 Instructor”, SDC Publications

Programme: B. Tech. (Civil) Sem – IV (2021)

Course: Vector Calculus and Differential equations		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 3 Hours / Week	End Semester Examination: 60 Marks Internal Assessment: 40 Marks	Theory: 3

Course Pre-requisites: The students should have knowledge of	
1	differentiation, integration, and differential equation
2	basic knowledge of vector algebra
Course Objectives:	
	To form mathematical model and solve mathematical problem in Civil Engineering
Course Outcomes: The student will be able to	
1	Form mathematical modelling of systems using differential equations and solve the differential equations
2	Apply mathematical modeling to physical systems using ordinary differential and evaluate particular solution.
3	Apply mathematical modeling of systems using partial differential equations and solve the partial differential equations
4	Apply Vector differentiation and integration that finds applications in solid mechanics, fluid flow, heat problems and potential theory etc.
5	Apply vector integral calculus to solve various problems in Civil Engineering.
6	Analyze the numerical data by applying statistical methods

Course Content:		
UNIT - I	**Linear Differential Equations (LDE)** Solution of nth order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy's &Legendre's DE, Solution of Simultaneous & Symmetric Simultaneous DE.	**(06 Hrs.)**
UNIT - II	**Applications of DE** Modeling of problems on bending of beams, whirling of shafts and mass spring systems. Applications of ODE to problems of Civil and allied engineering	**(06 Hrs.)**
UNIT - III	**Applications of PDE** Solution of Partial Differential Equations (PDE): Wave equation , 1D and 2D-Heat equation by using Separation of variables, Applications of PDE to problems of Civil and allied engineering	**(06 Hrs.)**
UNIT - IV	**Vector Differential Calculus)** Physical Interpretation of Vector Differentiation, Vector Differential Operator, Gradient, Divergence and Curl, Directional Derivative, Solenoidal, Irrotational and Conservative Fields, Scalar Potential, Vector Identities	**(06 Hrs.)**
UNIT - V	**Vector Integral Calculus**	**(06 Hrs.)**

	Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence Theorem, Stoke's Theorem. Applications to problems in Fluid Mechanics, Continuity equations, Streamlines, Equations of motion, Bernoulli's equations	
UNIT - VI	**Statistics and Probability** Measures of Central Tendency, Standard Deviation, Coefficient of Variation, Moments, Skewness and Kurtosis, Correlation and Regression, Reliability of Regression Estimates. Theorems and Properties of Probability, Probability Density Function, Probability Distributions: Binomial, Poisson, Normal and Hypergeometric; Test of Hypothesis: Chi-Square test.	**(06 Hrs)**

Unit Tests:
Unit Test I: Unit I to Unit III
Unit Test II: Unit IV to VI

Textbooks:

1. Peter V. O'Neil Advanced Engineering Mathematics by (Cengage Learning).
2. Erwin Kreyszig Advanced Engineering Mathematics by (Wiley Eastern Ltd.).

Reference Books:

1. B.V. Raman Engineering Mathematics by Tata McGraw-Hill.
2. M. D. Greenberg Advanced Engineering Mathematics, 2E, by Pearson Education
3. Wylie C.R. & Barrett L.C. Advanced Engineering Mathematics, McGraw-Hill, Inc.
4. B. S. Grewal Higher Engineering Mathematics by Khanna Publication, Delhi.
5. P. N. Wartikar & J. N. Wartikar Applied Mathematics Volumes I and II Pune Vidyarthi Griha Prakashan, Pune

Project Based learning topics for Vector Calculus and Differential equations:-
Students are expected prepare report on any one topic, write its definition, applications and illustrate with few examples. Also, write pseudo code/proof for it, wherever applicable

1. Method of variation of parameters
2. Cauchy's linear differential equation
3. Legendre's linear differential equation
4. Bending of beam
5. Mass spring system
6. Wave equation
7. One dimensional heat equation
8. Laplace equation
9. Directional derivative
10. Curl and divergence
11. Work done
12. Gauss divergence theorem
13. Stokes theorem
14. Central tendency
15. Measures of dispersion

16. Skewness and kurtosis
17. Theoretical probability distributions

Programme: B. Tech. (Civil) Sem – IV (2021)

Course: Open Channel Flow and Hydraulic Machinery		
TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS:
Theory: 04 Hours / Week Tutorial: 02 Hours/week	Semester End Examination: 60 Marks Internal Assessment: 40 Marks Term Work & Oral : 50 Marks	Theory: 04 Term work & Oral :01

Course Pre-requisites: The students should have knowledge of	
1	Fluid Mechanics basics, Types of flows, friction.
2	Basic knowledge of Water retaining structure like dam, weir etc. irrigation channel.
3	Basic knowledge of Drag & lift, unsteady flow.
4	Basic knowledge of Hydro power plant.
5	Basic knowledge of pumps.
Course Objective:	
To impart knowledge of open channel flows and hydraulic machinery to students.	
Course Outcomes: The student will be able to	
1	Design most efficient channel section, find critical depth of a flow.
2	Understand and apply knowledge of various flow profile and their characteristics.
3	Find energy dissipated in a hydraulic jump.
4	Calculate forces on vanes for different conditions.
5	Understand and apply knowledge of turbines.
6	Understand and apply knowledge of pumps.

Course Content:		
UNIT - I	**Uniform Flow in Open Channels** Basic Equations: Continuity Equation, Bernoulli's Equation, & Momentum Equation as applied to open channel one dimensional flow, Velocity distribution in open channel, Chezy's & Manning's formulae, factors affecting Manning's roughness coefficient, Normal depth, Conveyance Section factor, Most efficient channel section, Specific Energy, Specific Energy diagram, Depth-Discharge diagrams, alternate depths, Critical depth, Critical slopes, Froude number, Specific Force, Specific force diagrams, Conjugate depths, Depth-Discharge diagrams with respect to specific force.	**(08Hrs)**
UNIT - II	**Gradually Varied Flow in Open Channels** Gradually and rapidly varied flows, their examples, Basic assumptions in the derivation of GVF, Differential equations of GVF, Various GVF profiles, and their characteristics, Computations of GVF	**(08Hrs)**
UNIT - III	**Rapidly Varied Flow** Hydraulic Jump in Rectangular and Trapezoidal channels, Classification & Practical uses of Jump, Examples of occurrence of Hydraulic Jump, Conjugate Depths, Energy Dissipation in Hydraulic Jump, Location of Jump, Non Contact Flow measurement Devices for measurement of velocity and discharge in open Channels, Methods Stream gauging	**(08Hrs)**
UNIT - IV	**Unsteady Flow** Types, Flow through openings under varying head, Flow Compressibility, Celerity of Elastic Pressure Waves, Water Hammer Phenomenon, Rigid & Elastic water Columns Theories, Simple cases neglecting Friction, rapid acceleration of flow due to sudden opening of valve, surge tanks and their functions, Location and	**(08Hrs)**

	Classification. Fluid Flow around Submerged Bodies: Practical problems involving fluid flow around submerged bodies, Definition & Expression for Drag, lift, drag coefficient, Types of Drag.	
UNIT - V	**Impact of Jet and Turbines** Impact of Jet: Force Exerted due to impact of jet on stationary and moving flat and curved plates using linear momentum Principle, Principle of angular momentum, Euler's Momentum Equation for Turbines. Element of Hydropower plant, Hydraulic turbines, Heads & efficiencies, Governing of turbines, Design of Pelton Wheel, Cavitations in turbines, Performance of turbines, Prediction of performance in terms of unit quantities and specific quantities, specific speed.	**(08Hrs)**
UNIT - VI	**Centrifugal Pump** Theory of centrifugal pump, Centrifugal head due to rotation, Heads & efficiencies, .Design of Pumps Cavitations, Prediction of performance in terms of specific quantities, specific speed, characteristic curves.	**(08Hrs)**

Internal Assessment:		
	Unit Test -1	UNIT – I to III
	Unit Test -2	UNIT – IV to VI

Assignments (Any Six)		
1	Solve Four Numerical to find out Critical Depth.	
2	Solve Numerical on GVF to find out flow profiles	
3	Solve Numerical on Hydraulic Jump to find out dissipation of energy.	
4	Solve Numericals to find out forces on different types of vanes.	
5	Solve Numericals on design of Turbines.	
6	Solve Numericals on design of Pumps.	
7	Collection & Study of Information Brochure about different Hydraulic Machineries.	
8	Collection & Study of Information Brochure about Hydraulic Lab Supply Companies	
9	Solve Numericals of Drag & Lift	
Term Work (Any Eight)		
1	Flow around aerofoil.	
2	Flow around a Circular Cylinder.	
3	Impact of jet around flat / curved plate.	
4	Performance Curves of Hydraulic Turbine. Constant Head Characteristic Curve	
5	Characteristics of Centrifugal Pump.	
6	Uniform flow formulae of open channel.	
7	Velocity distribution in open channel flow	
8	Hydraulic jump as energy dissipater	
9	Characteristics of various GVF profiles	
10	Design of Hydraulic Centrifugal Pump	
11	Design of Hydraulic Turbine.	
12	GVF Computations by Direct Step Method	
13	Site Visit	
Oral: The Oral examination will be based on above term work and course content.		
Text Books:		

1	Garde R. J., Mirajgaonkar A. G., "Engineering Fluid Mechanics", Scitech Publication, Chennai
2	Rangaraju K. G., "Open Channel Flow", Tata McGraw Publication
3	Streeter Wylie, "Fluid Mechanics", Tata McGraw Publication
4	Subramanyam K., "Open Channel Flow", Tata McGraw Publication
5	Ven Te Chow, "Open Channel Hydraulics", Tata McGraw Publication
6	Zoeb Husain, Zanial Alimuddin, "Basic Fluid Mechanics and Hydraulic Machines" BSP Books Pvt. Ltd.
Reference Books	
1	Fox, McDonald, Pritchard, "Fluid Mechanics SI Version" Willey Student Edition
2	Frank M. White, "Fluid Mechanics", McGraw Hills Series
3	C P Konthadraman, R Roodramoorthy, "Fluid Mechanics & Machinery" New Academic Science
Topics for Project Based Learning for Open Channel Flow and Hydraulic Machinery	
1	Prepare a model of Undershot wheel
2	Prepare a model of turbine with curved blades
3	Prepare a model of orifice meter in UPVC pipe
4	Prepare a model of Symmetric aerofoil and test it
5	Prepare a model of asymmetric aerofoil and test it.
6	Prepare a model of Prepare a model of reaction turbine.
7	Prepare a model with hemispherical cups
8	Prepare a smoke to visualize flow pattern around the aerofoil.
9	Prepare a aerofoil model wrapped with cotton fibers around it to visualize turbulent flow in wind tunnel.
10	Prepare a model of Venturimeter conforming to standards.
11	Prepare a flat plate and curved vane (outside) model to be tested in Impact of Jet Apparatus.
12	Prepare a U tube manometer
13	Prepare a U tube inclined manometer
14	Prepare a U tube micro manometer
15	Prepare a Inverted U tube manometer
16	Prepare a detailed drawing for making hydraulic bench consisting of Venturimeter, orifice meter, and head loss through pipe fittings experiments.
17	Locate separation point of an aerofoil experimentally.
18	Locate separation point of a cylinder experimentally.
19	Calculate head loss for a centrifugal pump in water supply use.
20	Compare the drag forces on various shapes experimentally (Sphere, plate, etc)

Programme:B. Tech. (Civil) Sem – IV 2021

Course: Geomechanics		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 04 Hours / Week	Semester End Examination: 60Marks Internal Assessment: 40Marks	Theory:04
Practical: 02 Hours / Week	Term Work & Oral: 50Marks	TW & OR:1

Course Pre-requisites: The students should have knowledge of	
1	Statics and Dynamics
2	Mathematics
3	Fluid mechanics
Course Objective:	
	To make student capable to determine the index and engineering properties of soil and use of soil as a construction material.
Course Outcomes: The student will be able to	
1	identify and classify the soil according to formation of soil and its properties.
2	determine index properties of soil.
3	calculate coefficient of permeability and effective stresses of soil.
4	calculate the geostatic stresses and OMC of soil by various methods.
5	analysis of shear parameters of soil by various method.
6	compute lateral earth pressure on retaining wall.

Course Content:

UNIT – I	**Introduction of Geomechanics and soil classification**	**(08Hrs)**
	Introduction to Geomechanics Engineering and its applications to Civil Engineering, Types of soil structure, Field identification of soils basic definitions, three and two phase system of soil, soil classification systems – USCS, IS, HRB, Textural classification, Activity of clay, Sensitivity of clay, Thixotrophy of clay	
UNIT - II	**Index Properties of Soil**	**(08Hrs)**
	Index properties of soil – Water content, specific gravity, particle size distribution, Consistency limits, density, relative density, Relationship between index properties of soil.	
UNIT - III	**Permeability and Seepage**	**(08Hrs)**
	soil water, permeability-Basic Definition, Darcy's law, factors affecting permeability. Laboratory measurement of permeability: Constant head method and Falling head method as per IS 2720. Total, Neutral and effective stress-principle of effective stress, head gradient and potential, seepage pressure, Upward flow condition, 2 D flow, Laplace equation, flow net:- Characteristics and uses.	
UNIT - IV	**Compaction and Stress Distribution**	**(08Hrs)**
	Compaction: - Laboratory compaction tests; Factors affecting compaction; Structure and engineering behaviour of compacted cohesive soils; Field compactions equipments Stresses in soil: Geostatic Stresses, stress distribution, Bossinsque's	

	Theory for point load, Westergaard's theory		
UNIT - V	**Shear Strength of Soil**		**(08Hrs)**
	Introduction- Shear strength an Engineering Property. Mohr's stress circle, Mohr-Coulomb failure theory. The effective stress principle- Total stress, effective stress and neutral stress / pore water pressure. Peak and Residual shear strength, factors affecting shear strength. Stress-strain behaviour of sands and clays Measurement of Shear Strength- Direct Shear test, Triaxial Compression test, Unconfined Compression test, Vane Shear test. Their suitability for different types of soils, advantages and disadvantages. Different drainage conditions for shear tests.		
UNIT - VI	**Earth Pressure**		**(08Hrs)**
	Introduction, Rankine's state of Plastic Equilibrium in soils- Active and Passive states due to wall movement, Earth Pressure at rest. Rankine's Theory : Earth pressure on Retaining wall due to submerged backfill. Backfill with uniform surcharge, backfill with sloping surface, layered backfill.		
Internal Assessment:			
	Unit Test 1	**Unit I to III**	
	Unit Test 2	**Unit No IV to VI**	
Assignments:			
1	Study of various relationship between weight and volume, numerical based on it and classification of soil		
2	Study of determination of different index properties of soil and numerical based on it.		
3	Study of permeability and numerical based on it.		
4	Study of compaction of soil and numerical based on it.		
5	Determination of shear parameter of soil by various methods and numerical based on it.		
6	Numerical problem based on calculation of lateral earth pressure on retaining wall.		
Term Work:			
	The term-work shall consist of minimum **Eight** experiments from list below, out of which **first four are compulsory**.		
1	Determine water content of given soil sample by oven drying method		
2	Determine specific gravity of given soil by pycnometer method		
3	Determine of consistency limits of soil – Liquid, plastic and shrinkage limit.		
4	Determine the shear parameters of given soil by Direct shear test.		
5	Determine dry unit weight of soil in field by core cutter or sand replacement method.		
6	Determine co-efficient of permeability by constant head test or falling head test of given soil sample.		
7	Determine MDD and OMC by standard proctor test and Modified proctor test of given soil sample.		
8	Determine grain size distribution of given soil sample by mechanical sieve analysis.		

9	Determine the shear parameters of given soil by Unconfined Compression Strength of soil.	
10	Determine the shear parameters of given soil by Triaxial Shear Test	
11	Determine the shear parameters of given soil by Vane Shear Test	
Oral/Practical:		
	The oral examination based on above term work.	

Reference Books:

1) Punmia B.C., "Soil Mechanics and Foundation Engineering" Laxmi Publications
2) K. R. Arora, " Soil Mechanics & Foundation Engineering,
3) C. Venkatramaiah, "Geotechnical Engineering", New Age International Publishers
4) Das, B.M., "Principles of Geotechnical Engineering", Thomson Asia
5) Ranjan, G. and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age International Publishers.
6) Joseph E. Bowels, "Soil mechanics and Foundation Engineering", Tata McGraw Hill Publications Company, New Delhi

Topics for project based learning for Geomechanics

1.Prepare the chart of different classification of soils.

2. Collection the information about soil deposits in various regions of India and show in the map of India

3. Prepare the chart of different types of soil structure.

4. Calculate the water content and specific gravity of soil (take at least three different soil sample)

5. Calculate the consistency limit and flow index of soil (take at least three different soil sample)

6. Prepare chart showing all basic index properties of soil.

7.Draw the particle size distribution curve for soil by using excel (take at least two different soil sample)

8. Prepare the chart for relationship between index properties of soil.

9. Compare the constant head and falling head method.

10. Prepare the chart for soil water and permeability of soil.

11. Draw the flow net for sheet pile or earthern dam.

12. Compute the permeability of stratified soil deposits by using excel.

13. Prepare the chart of derivation of Laplace equation for two-dimensional flow.

14. Compare the standard proctor and modified proctor test.

15. Collection of information and photographs of machines used for compaction of soil.

16. Draw the optimum moisture curve for compaction of soil by using excel.

17. Draw the Mohr's stress circle for triaxial shear test and unconfined compression test.

18. solution of problems on shear strength parameter by using graphical method. (At least three problem).

19. Prepare the chart showing lateral earth pressure distribution diagram on retaining wall in various conditions.

20. Contribution of various scientists in estimation of active and passive earth pressure on retaining wall.

Programme : B.Tech (Civil) Sem – IV (2021)

COURSE: ANALYSIS OF DETERMINATE STRUCTURES

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 03 Hours / Week	Semester End Examination: 60 Marks	Theory: 03
Tutorial: 01 Hour / Week	Internal Assessment: 40 Marks	Tutorial: 01

Course Pre-requisites: The students should have knowledge of

1 Statics and Dynamics
2 Mechanics of Solids

Course Objective:

The student should be able to calculate member forces and deflection of determinate beams, trusses and arches.

Course Outcomes: The student will be able to

1 Determine degree of indeterminacy of structures.
2 Deflection of joints of determinate truss.
3 Construct Influence line diagram for forces in beams.
4 Calculate maximum forces in beams using Influence line diagram.
5 Calculate maximum forces in truss member using Influence line diagram.
6 Calculate forces in three hinged arch.

Course Content:

Unit-I **Basic Concepts** **(06 Hrs)**

Classification of structures, Types of structures, skeletal structures; members and member forces, joints, supports, loads and load effects; Concept of stability; Concepts of indeterminacy and degrees of freedom; Static and Kinematic degree of indeterminacy; Deflected shape of beams and frames.

Unit-II **Strain Energy and Deflection of Truss** **(06 Hrs)**

Strain Energy: Concept of strain energy; Modulus of Resilience; Strain energy due to axial force, shear force, bending moment and torsional moment.

Deflection of joints of determinate truss using Castigliano's first theorem

Unit-III **Influence Line Diagrams for beams:** **(06 Hrs)**

Basic Concept of Influence lines, Construction of Influence Line Diagrams (ILD) for Support reactions, Shear Force and Bending Moment at a given section for simply supported beams, overhanging beams and compound beams. Muller-Breslau's principle and its application to above beams.

Unit-IV **Application of Influence Line Diagrams for rolling loads on beams:** **(06 Hrs)**

Rolling loads - Use of influence line diagram for determination of SF and BM in beams due to UDL shorter than span, UDL longer than span, Series of concentrated loads. Conditions for maximum SF and maximum BM values

Unit-V **Influence Line Diagrams and its application for truss:** **(06 Hrs)**

Influence line diagram for axial forces in members of plane determinate trusses. Use of influence line diagram for determination of member forces of plane determinate trusses under dead load and live load.

Unit-VI **Analysis of Three Hinged Arch** **(06 Hrs)**

Concept and types of arches, Three hinged arches – analysis, Calculation of horizontal Thrust, Radial Shear, Normal Thrust and BM at a cross section.

Internal Assessment:

Unit Test -1	UNIT – I, II, III
Unit Test -2	UNIT – IV, V, VI

Assignments:

Students should complete assignments from

1. Draw different types of structures - space, plane, trusses, beams and frames
2. Draw deflected shapes of different types of structures.
3. Calculate degree of static indeterminacy.
4. Calculate degree of kinematic indeterminacy.
5. Calculate deflection of truss using Castigliano's first theorem.
6. Draw ILD for beams for reaction, SF and BM
7. Calculate maximum SF & BM due to moving loads on beam.
8. Draw ILDs for members of the Truss
9. Calculate maximum axial force in truss due to moving loads.
10. Analyse of three hinged arch

Reference Books:

1 Hibbeler R. C., “Structural Analysis”, Prentice Hall Publication
2 Aslam Kassimali, “Structural Analysis”, Cengage Learning.
3 Timoshenko S. P. & Young, “Theory of Structures”, McGraw Hill Publication
4 Bhavikatti S.S., “Structural Analysis- I and II”, Vikas Publication.
5 Pandit G. S. & Gupta S. P., “Theory of Structures Vol-I and Vol-II”, Tata McGraw Hill Publication
6 Ramamrutham S. & Narayan R., “Theory of Structures”, Dhanpat Rai Publishing Company
7 Prakash Rao D. S., “Structural Analysis”, Universities Press Publication
8 Menon Devdas “Structural Analysis”, Alpha Science International Publication.
9 Khurmi R.S. “Theory of Structures”, S. Chand Publication

Topics for Project Based Learning:

1 Make model of different types of supports
2 Make model of different types of structure
3 Prepare PPT on different types of structures - space, plane, trusses, beams and frames
4 Prepare chart for different types of structures - space, plane, trusses, beams and frames
5 Make model of beam and frame with different types of supports
6 Prepare animated PPT to show deflected shapes of different types of structures.
7 Prepare PPT on degree of static indeterminacy
8 Prepare PPT on degree of kinematic indeterminacy
9 Make skeletal model of truss
10 Analyse truss using software.
11 Prepare PPT on deflection of truss
12 Prepare PPT on ILD of truss

13 Prepare chart on ILD of truss
14 Draw an ILD of truss using software
15 Prepare PPT on ILD of beams
16 Prepare chart on ILD of beams
17 Draw an ILD of beams using software
18 Make model on Muller-Breslau's principle
19 Make model of three hinged arch
20 Prepare PPT on analysis of three hinged arch
21 Prepare chart on analysis of three hinged arch

Programme: B. Tech. (Civil) Sem – IV (2021)

Course: Planning & Management of Construction Projects		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 04 Hours / Week	Semester End Examination: 60 Marks Internal Assessment: 40 Marks	Theory: 04
Practical: 02 Hours / Week	Term Work & Oral: 50 Marks	TW & OR: 1

Course Pre-requisites: The students should have knowledge of	
1	Building Construction.
2	Building Planning and Design
Course Objective:	
	To prepare the student to analyze the network and monitor and control the civil engineering projects.
Course Outcomes: The student will be able to	
1	prepare organization chart.
2	Explain bar charts and elements of network
3	prepare a network and analyze by CPM and PERT methods.
4	update network and carryout resource allocation
5	carry out material management
6	check quality parameters in construction process.

Course Content:		
UNIT – I	**Project Management:** Basics of Management, Modern scientific management (Contribution by Fayol, F.W. Taylor, Mayo) Importance, Objectives and functions of Management, Importance of organizational structure, types of organizations, Site Layout.	**(08 Hrs)**
UNIT - II	**Planning & Scheduling:** Work breakdown structure, Introduction to Gantt /Bar Charts and its limitations, Milestone Charts, Development of Network Problems, Elements of Network-Event, Activity, Dummy, Types of Networks, Network Rules **Microsoft Office Project:** Introduction to MS Project	**(08 Hrs)**
UNIT - III	**Network Analysis**: Critical Path Method (CPM), Types of Floats, Program Evaluation, and Review Technique (PERT), Time Computations, Slack.	**(08 Hrs)**
UNIT - IV	**Project Monitoring & Control** Resource Allocation, Resource Smoothening and Leveling, Crashing of Network, Direct Cost and Indirect Cost, Cost Slope, Updating of Network.	**(08 Hrs)**
UNIT - V	**Material Management:** Objectives of material management, material requirement, scheduling, monitoring, inventory control, inventory classification, inventory management, inventory models, economic order quantity, ABC analysis.	**(08 Hrs)**
UNIT - VI	**Total Quality Management:**	**(08 Hrs)**

	Importance of Total Quality Management in Construction Process and Steps Involved, Concept of Quality Control, Quality Assurance, Quality Management and TQM, Six Sigma Concept. **MIS**-Introduction, Necessity of in Management		
Syllabus for Unit Test:			
	Unit Test -1	UNIT – I to III	
	Unit Test -2	UNIT – IV to VI	
Term Work: The term-work shall consist of -			
	1) Assignment on different types of organization and their flowcharts.		
	2) Assignment on bar chart and milestone chart.		
	3) Assignments on CPM.		
	4) Assignments on PERT.		
	5) Assignment on crashing of network.		
	6) Assignment on updating of network.		
	7) Assignment on MS Project.		
	8) Mini Project- Preparation Network and analysis for a building construction project and finding out different types of floats.		
Oral:			
	The Oral examination is based on above term work and course content.		

Reference Books:

1. Construction Engineering and Management by S. Seetharaman, Umesh Publications, New Delhi.
2. PERT & CPM principles & applications by L.S. Srinath, affiliated East West press Pvt. Ltd., New Delhi.
3. Project Planning & control with PERT & CPM by Dr. B.C. Punmia, K.K. Khandelwal, Laxmi Publications (P) Ltd, New Delhi.
4. Construction Project Management Planning, Scheduling, and controlling by K.K. Chitkara TMH Publishing Company, New Delhi
5. Civil Engineering Project Management by Alan C. Twort& J. Gordon Rees, Elsevier
6. Project Planning, Analysis selection, Implementation & Review by Prasanna Chandra, Tata McGraw Hill, New Delhi

Topics for Project Based Learning:

1.	Prepare a detailed site layout for any one type of Constriction project.
2.	Prepare a detailed Organizational Structure for at least two types of Projects.
3.	Prepare two detailed Projects in Microsoft Office Project.
4.	Prepare a work breakdown structure for two different type of construction projects.
5.	Prepare two detailed bar charts for any type of construction Project.
6.	Prepare a detailed Milestone chart for Infrastructure project.
7.	Prepare a detailed project analysis using Critical Path Method for two different Projects.
8.	Prepare a detailed project analysis using Program Evaluation and Review Technique for two different types of research projects.
9.	Prepare a detailed report on use and application of time computation in network analysis for construction projects.

10.	Prepare a detailed report on the benefit of use of different types of Floats on Critical Path Method for analysis of construction projects.
11.	Prepare a detailed report on resource allocation in two different types of Construction Projects.
12.	Prepare a detailed report on use of resource smoothing and levelling on construction projects.
13.	Prepare a report on Crashing of Network for Construction Projects with use of Direct cost, Indirect Cost and Cost slope.
14.	Prepare a report on controlling of raw material and work in progress inventory for a construction project.
15.	Prepare a report on use of Inventory Models in Construction Projects.
16.	Prepare a project report on use of inventory control and classification for different types of construction projects.
17.	Prepare a detailed report on Importance on application of Total Quality Management for different types of Construction Projects.
18.	Prepare a report on use of Six Sigma Concept in Construction Projects.
19.	Prepare a report on necessity and use of MIS in Construction Management.
20.	Prepare a report on necessity and use of Quality Control and Quality Assurance for different construction projects.

B. Tech. (Civil) –Sem IV -2021 Course

Plumbing Engineering

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Practical: -- Hours / Week	Term work& Oral: 50 Marks	Term work & Oral: 02

Course Pre-requisites:

The Students should have knowledge of

1.	Basic Civil Engineering. and Civil Engineering Drawing Knowledge
2	Knowledge of Building Planning and Designing.

Course Objectives:

	To develop the knowledge of basic Plumbing Engineering techniques required for various construction projects.

Course Outcomes:

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

1.	Identify and select proper tools and use them for the given plumbing work
2.	Select appropriate pipes and carry out pipe fitting after carrying out operations like cutting, bending, threading, joining, aligning and other necessary operations
3.	Erect simple water supply system. Trace leakage and repair water supply system
4.	Plan, prepare and inspect domestic drainage system
5.	Select and install sanitary appliances
6.	Install heating appliances like geyser, etc.

UNIT - I	**Introduction to Plumbing System**
	Introduction to Plumbing System: Cold Water, Gray Water System, Sewage System,Hot Water Circulating System, Irrigation System,Storm Water System **Common Sanitary Fixture Details:** Lavatories, Water Closet, Showers, Sinks, Bathtubs,Bidets, Urinals, Floor drains, Layout of Sanitary fixtures in toilet **Formula for flow through pipes:** Darcy formula, Chezy's formula, Manning's formula, Hazen formula, Reynolds number (Laminar and Turbulent Flow) **Drainage System:** Soil Pipe System, Waste Pipe System, Vent Pipe System, Types of Pumps, Pump Laws, Pump in series and parallel

UNIT - II	**Water System**
	Cold Water System : Domestic Water Tank (or) Underground reservoirSizing, Elevated Roof Tank (storage cistern) orOverhead tank Sizing, Cold Water Pipe Sizing inBuilding as per flow rate and fixture UnitMethod(WFU), Minimum number of smaller diameterwater pipes that can be connected to bigger pipes.Plumbers Chart for Pipe Sizing, Box Formula, Boosterpump sizing & transfer, Pump Sizing(HPWatts), Auto Pneumatic, System & Pressure Tank Sizing,External Water Supply, Pipe Sizing, Pump RoomDesign with valve connection detail, Design of External Water System **Gray Water System:** Grey water cycle, Water Tank Sizing, Booster PumpCalculation, Grey water pipe sizing, Flush Water, Potable and non potable loop pipe sizing (Software). **Hot Water System:** Hot Water System Designing, Estimating Hot WaterDemand, Calculating the Capacity of Non-Central &Central Water Heaters, Hot Water Pipe Sizing, Hot Water Circulating Pump Design, Up feed System, Down feed System & Combination of Up feed andDown Feed System, Solar Water heater (EnergySaving Calculation). **Irrigation System:** Garden Water Supply and Fountain, Garden Water Supply and Fountain pipe sizing, Calculation ofstorage tank, Garden water fountain designing &pump selection **Drainage System:** Soil and Waste water drain calculation in buildingvertical stack, Branch drain / Discharge pipe,horizontal drain, Fixture unit rating, Maximumnumber of discharge unit allowed in stack, Design ofhorizontal drains by discharge unit method(DFU),Invert level & Slope calculation, Sump Pit Sizing,Submersible Sump Pump Sizing, Design of Septic tank, Soak away pits, Dispersion trenches, Oil andGrease Interceptor Designing, Designing of commonappurtenances, Inspection Chambers and Junctionmanholes, External foul water drainage for building. **Storm water System:** Designing of Storm water Drainage system inbuilding, Sizing of Rain Water Gutters, External Storm water drainage system Designing.
UNIT - III	**Water Balancing Calculation**
	Water Balancing Calculation. WTP(Water Treatment Plant), STP(Sewage Treatment Plant), Green Building (Water Saving Calculation), Plumbing Designing for High Rise Building, PRV Calculations
UNIT - IV	**Tendering Requirements**
	Understanding the tendering requirements, Quantity take off, Preparing Inquiry for Suppliers & Finalizing the suppliers, Final Billing & Quotations finalization
UNIT - V	**Preparation of purchase orders**
	Preparation of purchase orders, Quotation Evaluation Sheet

UNIT - VI	Plumbing Design Drawing and site Installation
	Representation of Concepts Design Drawing, Design Drawing & Shop Drawing, Location maps, Site Plan, Plan of Roof, Floor plan of the building, Enlarge floor plan of toilet kitchen, Plan elevation & cross section of structures including reinforcement details, Detailing of Plumbing services and preparing plumbing drawing, Isometric Drawings, Riser Diagram, Site Installation Procedure :Testing, Adjusting, Balancing Concept & Process. Installation & Inspection. Safety Measures. Pressure Testing. Testing & Commissioning. Tracking List.

Term Work: The term work shall consist of File and drawing containing record of (any 6) exercises out of which Term work No 6 and 7 are compulsory and project, listed below.

1. Introduction of available codes in plumbing.
2. Report on necessity of traps, intercepts and vents
3. Roles of plumbing contractor and plumbing consultants
4. Report on Plumbing fixtures and fittings and explain any ten.
5. Report on materials for water supply and drainage
6. Detailed hydraulic design for plumbing of G+1 Bungalow
7. Design solar water piping for G+1 Bungalow
8. Detailed Plumbing design for high rise structure
9. Drafting purchase orders for Plumbing Project
10. Project 1: This syllabus will followed by a live project and a 2 Days Workshop on project implementation
    OR
    Project 1: Site Visit and report on site visit
11. Project 2 :Plumbing Design Drawing and site Installation For a G+1 Bungalow

Text Books

1. "Plumbing Engineering, Theory and Practice" by Subhash Patil. SEEMA Publishers Mumbai

2. " Plumbing Engineering" by Deolalikar

Reference Books:

1. "Plumbing, Sanitation and Domestic Engineering" Volume – 1to 4 by G. S. Williams, Mc Graw Hill
2. "Plumbing, Sanitation and Domestic Engineering, Data Sheets & Wall Charts" by G. S. Williams, Mc Graw Hill
3. Codes -- Uniform Plumbing Code-India

Programme: B. Tech. (Civil) Sem – IV 2021 **Course: CONSTRUCTION PRACTICES IN CIVIL ENGINEERING**		
TEACHING SCHEME	**EXAMINATION SCHEME**	**CREDITS ALLOTTED**
Practical: 04 Hrs/Week	Term Work –50 marks	Term Work:02

Course Pre-requisites:	
The Student Should have knowledge of	
1.	Fundamental of Civil engineering.
2.	Building Construction
3.	Engineering mathematics.
4.	Concrete Technology
5.	Building Planning, Designing and Bylaws
Course Objective	
1.	To make students understand Civil Engineering Practices.
Course Outcomes	
The students will be able to	
1.	setout of foundation for buildings.
2.	carry out testing of construction materials
3.	manage inventory on site.
4.	maintain quality control on site.
5.	work as a site engineer
	List of Practical (Any 15)
1	Testing of concrete cubes of different grades.
2	Slump test on concrete and effect of plasticizers.
3	Study of reinforcement and its bending for different structural members.
4	Study of various of drawings required on construction sites (Compulsory)
5	Setting out and layout of building foundation.

6	Study of formwork& scaffolding. (Compulsory)
7	Construction of different types of brick masonry bonds, study of recent types of bricks and blocks (Compulsory)
8	Study of plastering & pointing. (Compulsory)
9	Study of different types of tiles. (Compulsory)
10	Introduction - Water supply & sanitary fittings and appliances (Compulsory)
11	Concealed construction practices.
12	Types of paints. (Compulsory)
13	Methods of Waterproofing of toilets & roofs. (Compulsory)
14	Study of Deck Slab
15	Study of stock register format and daily report. (Compulsory)
16	Study of construction of concrete walls
17	Study of precast techniques (Compulsory)
18	Study of Advance Water proofing Techniques
Reference Books:	
1.	A to Z Building Construction by Mantri publication.
2.	My Construction Practices by R.B. Chaphalkar.

Programme: B. Tech (Civil) Sem – IV 2021

Course: Civil Engineering Software III HEC-RAS		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Practical: 04 Hours / Week	Term Work & Oral: 50 Marks	TW & OR:02

Course Pre-requisites: The students should have knowledge of	
1	Basic Knowledge of open channel flow
2	Direct step method of Gradually Varied flow
3	HEC-RAS 4.0 and above with PC
Course Objective:	
	The student should be able to determine flow profiles for given flow conditions
Course Outcomes: The student will be able to	
1	determine critical depth of flow
2	determine normal depth of flow
3	determine depth of flow for uniform flow conditions
4	determine critical depth of flow in case of confluence of channel.
5	determine normal depth of flow in case of confluence of channel
6	determine depth of flow in case of confluence of channel for uniform flow conditions

Term Work: The term-work shall consist of -		
	1) Analyse a rectangular channel for critical depth.	
	2) Analyse a rectangular channel for normal depth.	
	3) Analyse a trapezoidal channel for critical depth..	
	4) Analyse a trapezoidal channel for uniform depth.	
	5) Analyse a rectangular channel for uniform depth.	
	6) Analyse a trapezoidal channel for normal depth.	
	7) Analyse the flow for uniform depth at a confluence of two channels..	
	8) Analyse the flow for critical depth at a confluence of two channels.	
Oral/Practical: The Oral examination is based on above term work.		