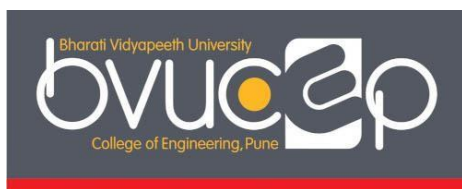


Bharati Vidyapeeth
(Deemed to be University)
Pune, India

College of Engineering, Pune



Program Curriculum

B.Tech (Civil Engineering)-2021

Sem – III & IV

(w.e.f. from 2022-23)



**BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE**



VISION OF UNIVERSITY:

Social Transformation through Dynamic Education

MISSION OF UNIVERSITY:

- To make available quality education in different areas of knowledge to the students as per their choice and inclination
- To offer education to the students in a conducive ambience created by enriched infrastructure! and academic facilities in its campuses.
- To bring education within the reach of rural, tribal and girl students by providing them substantive fee concessions and subsidized hostel and mess facilities
- To make available quality education to the students of rural, tribal and other deprived sections of the population

VISION OF THE INSTITUTE

To be World Class Institute for Social Transformation through Dynamic Education.

MISSION OF THE INSTITUTE

- To provide quality technical education with advanced equipment, qualified faculty members, infrastructure to meet needs of profession and society.
- To provide an environment conducive to innovation, creativity, research and entrepreneurial leadership.
- To practice and promote professional ethics, transparency and accountability for social community, economic and environmental conditions.

DEPARTMENT OF CIVIL ENGINEERING

VISION OF DEPARTMENT

To create Civil Engineers who will transform Civil Engineering Industry for sustainable development of society.

MISSION OF DEPARTMENT

- To create Civil Engineers enriched with quality technical education.
- To inculcate innovation, creativity and research approach among the graduants.
- To create entrepreneurs practicing professional ethics.



BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE



PROGRAMME: B.TECH (CIVIL ENGINEERING)

Programme Educational Objectives (PEOs):

PEO1: To prepare students for career in Civil Engineering Profession.

PEO2: To develop a responsible 'Entrepreneur.'

PEO3: To develop the student to cope up with the advancements in Civil Engineering.

Programme Outcomes (PO): An Engineering Graduates will be able to:

PO-1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9. Individual and team-work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs): A Civil Engineering Graduates will be able to:

PSO1: Industry Exposure: adapt to work and address challenges in construction Industry

PSO2: Optimal and Sustainable Solution: workout optimal and sustainable solution to infrastructural needs of the society




Bharati Vidyapeeth, the parent organization of this University is one of the largest educational organizations in the country. It has 171 educational units under its umbrella including 67 Colleges and Institutes of conventional and professional education.

The Department of Human Resource Development, Government of India on the recommendations of the University Grants Commission accorded the status of "Deemed to be University" initially to a cluster of 12 units of Bharati Vidyapeeth. Subsequently, 17 additional colleges / institutes were brought within the ambit of Bharati Vidyapeeth Deemed University wide various notifications of the Government of India. Bharati Vidyapeeth Deemed University commenced its functioning on 26th April, 1996.

Constituent Units of Bharati Vidyapeeth (Deemed to be University)

1. BVDU Medical College, Pune.
2. BVDU Dental College & Hospital, Pune
3. BVDU College of Ayurved, Pune
4. BVDU Homoeopathic Medical College, Pune
5. BVDU College of Nursing, Pune
6. BVDU Yashwantrao Mohite College of Arts, Science & Commerce, Pune.
7. BVDU New Law College, Pune
8. BVDU Social Sciences Centre (M.S.W.), Pune
9. BVDU Yashwantrao Chavan Institute of Social Science Studies & Research, Pune.
10. BVDU Centre for Research & Development in Pharmaceutical Sciences & Applied Chemistry, Pune
11. BVDU College of Physical Education, Pune.
12. BVDU Institute of Environment Education & Research, Pune
13. BVDU Institute of Management & Entrepreneurship Development, Pune
14. BVDU Poona College of Pharmacy, Pune
15. BVDU College of Engineering, Pune
16. BVDU Interactive Research School in Health Affairs (IRSHA), Pune
17. BVDU Rajiv Gandhi Institute of Information Technology & Biotechnology, Pune
18. BVDU College of Architecture, Pune
19. BVDU Abhijit Kadam Institute of Management & Social Sciences, Solapur
20. BVDU Institute of Management, Kolhapur
21. BVDU Institute of Management & Rural Development administration, Sangli
22. BVDU Institute of Management & Research, New Delhi
23. BVDU Institute of Hotel Management & Catering Technology, Pune

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24. BVDU Yashwantrao Mohite Institute of Management, Malakapur-Karad
 25. BVDU Medical College & Hospital, Sangli
 26. BVDU Dental College & Hospital, Mumbai
 27. BVDU Dental College & Hospital, Sangli
 28. BVDU College of Nursing, Sangli
 29. BVDU College of Nursing, Navi Mumbai


The status of University was given to a cluster of these colleges and institutes in appreciation of the high level of their academic excellence and for their potential for further growth.

During the last 20 years or so, the University has achieved higher pinnacles of academic excellence and has established its reputation to such an extent that it attracts students not only from various parts of India but also from abroad. According to a survey conducted by Association of Indian Universities, this University is one among the top ten Universities in the country preferred by the overseas students for admissions. At present, there are more than 850 overseas students from 47 countries on the rolls of constituent units of this University.

During the last 20 years, there has been tremendous academic expansion of the University. It now conducts in all 305 courses in its constituent units, of them 108 are Post Graduate, 45 are Under Graduate and 55 Diploma level courses, 12 Fellowship and 5 certificate courses. All the professional courses which the University conducts such as those of Medicine, Dentistry, Engineering etc., have approval of the respective statutory councils, viz., Medical Council of India, Dental Council of India, All India Council for Technical Education etc.

The University is a throbbing center of research activities and has launched Ph.D. programmes in 77 subjects and M.Phil in 3 subjects. It has also introduced quite few innovative academic programmes such as Masters in Clinical Optometry, M.Tech. in Nano Technology etc.

The University's performance and achievements were assessed by the "National Assessment and Accreditation Council" and it was reaccredited with a prestigious "A" grade in 2011. Some programmes of the constituent units such as College of Engineering at Pune, Management Institute in Delhi and others have also been accredited by "National Board of Accreditation". Three constituent units of Bharati Vidyapeeth Deemed University are also the recipients of ISO 9001-2001 certifications.



Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune



College Information :

Bharati Vidyapeeth University College of Engineering, Pune (BVUCOE) established in 1983, a constituent unit of BVU (University with 'A' Grade status by MHRD, accredited to Grade 'A' by NAAC in 2004 and 2011) and holds a place of pride and is amongst the most reputed institute. It has been ranked to 61st by National Institutional Ranking Framework (NIRF) with criteriawise ranking as 5th in Graduate Outcome (GO), 13th in Outreach and Inclusivity (OI), 44th in Teaching Learning Resources (TLR) and 62nd in Perception (PR). This also made institute to stand 4th in the State of Maharashtra. Further, DATAQUEST-CMR national survey also ranked this institute to 4th among private technical institutions of India, 29th by Times of India and 41st by OUTLOOK. This is the only institute selected by MHRD for its Technical Education Quality Improvement Programme (TEQIP-II – 1.1 Programme) for the grant of Rs. 4 Crores.

BVUCOE, Pune offers 09 graduate, 08 post graduates programmes and Doctoral programmes in 08 disciplines. All Programmes are accredited by National Board of Accreditation (NBA) twice and we have applied for third cycle of accreditation.

Institute has its own spacious well designed building measuring 26,286 sq. m. and it houses 101 labs, 43 class rooms, and 21 tutorial rooms. The library of the institute is a five storied building and houses periodical section, computer center, reading hall, reference section. It contains more than 60,000 books, 15,000 volumes, 80 national and 81 international journals subscription and digital library facility. Digital library of institute with 66,944 number of journals in e-form is one of the richest source of knowledge in e-form for students and faculty members. The Library, Laboratories, Equipments, Learning resources and Software constantly get upgraded and updated in tune with the changing time. An Investment of Rs.119.95 million is made in the last five years.

The structured faculty development programme has strengthened quality of Teaching - Learning Process in the institute. 35 faculty members with Ph. D. qualifications have been proved as resources for research, innovations and sound Teaching – Learning Process. As a part of quality improvement programme 04 number faculty members were deputed to International Universities, Institutions of national importance such as IIT, NIT etc. for qualification improvement. Team of 206 faculty members with average experience 11.7 years and average age 38.3 years indicates teachers with fine blend of experience and youth. Faculty members are well conversant and trained for use of latest softwares and latest equipments being purchased every year as policy of upgrading laboratories. In last five years college has invested Rs. 119.95 million in laboratory upgradation. Institute organized 138 number of continuing education programmes in last five years to keep sharpen skills of faculty members. Further, 1389 faculty members were deputed to attend various workshops and training programmes for sharing and enhancing their knowledge. Faculty members also play active role in curriculum development as Member of Board of Studies of various subjects and other statutory bodies of the University.

The research quality is indicative of the university penchant for quality. The research publications in reputed international and national refereed journals and conferences have shown a steady and significant rise over the years which is aptly reflected by 1091 Research papers publications in reputed national and international journals in last five years. Grant

of Rs. 152.73 Lakhs from funding agencies such as UGC, DST, DRDO, AICTE etc. fetched by faculty members is strong indicator of research aptitude of faculty members. Seed money up to Rs. 3 lakhs under Institutionally Funded Research Programme (IFRP) nurtures research aptitude of faculty members. 575 number of publications in standard research databases such as SCOPUS, Web of Science, Google Scholar etc. in last five years throws light on quality of publications by faculty members of this institute. These publications by faculty members have received 137 number of citations in the same period. Institute has 02 patents to its credit and filed 05 patents.

The institute has collaboration with international universities such as North Carolina A & T State University, Greensboro, USA, Joint School of Nanoscience and Nanoengineering (JSNN), USA, The University of Tokushima, Japan, ARM University, USA and with industries such as TCS, SKF India Ltd. Every year one faculty member is deputed for Ph. D. programme in NCAT with scholarship. Students of M. Tech. (Nanotechnology) joins JSNN, USA to pursue their dissertation research work for six months with scholarship to the tune of \$1000 per month. Further, NCAT, USA, The University of Tokushima, Japan contributes intellectually as well as financially to organize biannual international conference NANOCON. Three editions of NANOCON are conducted since 2010 with their association. In association with Eduvance & GAATsis, a “Center of Excellence in Embedded Systems” is established in the Institute with donation of Educational kits like ARM development boards from ARM University Program and PSoC kits by Cypress Semiconductors are used for developing projects in the sponsored laboratory. TCS supports students and faculty members for faculty enablement programmes and student development programme. Establishment of Lubricant Conditioning Monitoring Laboratory is outcome of collaboration with SKF India Ltd.

Being Deemed University college takes advantage of academic autonomy in making the curriculum industry oriented and enable students to make employable. In-plant training (45 days), courses such as Professional Skill Development introduced as integrated part of course structure. In-plant training enable students to interact within their associated industries for gaining practical field experience and professional exposure. Curriculum is Choice Based Credit System which makes students path of joining international universities for their higher studies smoother.

Today, qualitative soft skill development in students is more pertinent to a student's professional career. The institute regularly arranges training programme in the area of personality development, aptitude test, group discussion and personal interview. Through its Employment Enhancement Programme (EEP) designed for third year students which comprises of communication skill quantities analysis, corporate culture, IT Training and soft skills. This programme is conducted in association with professional institutes of national repute for effective execution and implementation. To enhance their professional experience and get them head start in the industry, an innovative programme is initiated on student mentoring “Saturday @ BV”, wherein speakers are entrepreneurs and high ranked corporate who share their experiences, hardship and their corporate journey.

In it's long, multi-pronged, persistent and pain staking efforts for producing quality engineering professionals, institute has produced more than 1068 entrepreneurs.

Salient Features

The Department of Civil Engineering offers undergraduate, postgraduate and doctorate degree courses. The department possesses qualified faculty, state-of-the-art infrastructure and its own library. As a part of the infrastructure, the department laboratories are equipped and are capable of conducting research projects and provide consultancy to the experience of the industry relevant softwares that are part of their curriculum. The curriculum is kept up-to-date and relevant by involving industry experts in the revision process. The department has a very active student association which is managed by the students. This association organizes events, expert lectures, site visits and personality development programs every year. The association also publishes a newsletter and maintains its own website. All students complete a six week internship before their final year. For their internship they are sent to various companies across India for on-the-job training in various technical roles.

The Department of Civil Engineering is honing the potential of the students to face the challenges in this vast field. The department also runs a postgraduate course in Hydraulic Engineering, for which it receives the guidance from internationally recognized scientists in the field of Hydraulics. The P.G. Students perform their dissertation works in collaboration with CW & PRS Laboratories, Government of India-especially the model studies.

Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including works like roads, bridges, canals, dams, and buildings. Civil engineering is the oldest engineering discipline after military engineering. Due to extensive growth in the construction, infrastructure and real estate sectors in India, the demand of civil engineers is high. Career opportunities for these professionals are available with firms of both the private and public sectors. Besides this, job opportunities are obtainable for them abroad too. Civil Engineers can pursue a very lucrative career.

Major Topics of Research Undertaken :

- Studies in the areas of sediment transport and fluid mechanics related to non uniform sediments, hydraulic design of spillways and design of permeable spurs.
- Structural Engineering : Studies of earthquake resistant structures and composite materials.
- Geotechnical Engineering: Utilization of waste plastics in road sub base.
- Environmental Engineering: Use of Moringa Olifera as a coagulant for treatment of potable water.

Research Facilities Developed

- Modernization of Environment Engineering laboratory to carry out research related to water quality management and air pollution control. For this purpose AICTE has provided grant of Rs. 6,00,000/- under MODROBS scheme.
- In Hydraulics Engineering Laboratory, tilting flume and wind tunnel facilities are established.

Consultancy

Testing and Consultancy in the areas of geotechnical Engineering, Structural Engineering and Environmental Engineering is carried out. Total revenue generated in last five years is Rs. 16 lacs.

Total Research Grants Recieved from Academic Year 2004-05 to 2014-15: Rs 7.35 lacs
Research Publications from Academic Year 2010-11 to 2014-15:

Type of Publication	No of Publication
International Journal	43
National Journal	03
International Conference	07
National Conference	04
Total	57

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

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

Program: B. Tech. Civil
Course

Sem: III

CBCS2021

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

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

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 equation	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 Project	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

COURSE: MECHANICS OF SOLIDS

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
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 (06Hrs)

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

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

Unit-II	Shear Force and Bending Moment Diagram	(06 Hrs)
	<p>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</p> <p>Bending moment and loading diagram from given shear force diagram.</p>	
Unit-III	Bending Stresses and Deflection of Beam	(06 Hrs)
	<p>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.</p> <p>Deflection of Beams: Concept of relation between deflection, slope, bending moment, shear force and intensity of loading; Macaulay's method, Elastic curve.</p>	
Unit-IV	Direct and Torsional Shear Stress	(06 Hrs)
	<p>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</p> <p>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.</p>	
Unit-V	Combined Stresses and Axially Loaded Column	(06 Hrs)
	<p>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.</p> <p>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</p>	
Unit-VI	Principal Stresses and Principal Planes	(06 Hrs)
	<p>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.</p>	

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

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.

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

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.

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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.

Course: Construction Equipment & Methods

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS: 05
Theory: 04 Hours / Week	Semester End Examination: 60 Marks	
	Internal Assessment: 40 Marks	Theory: 04
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.

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Unit-II	Under Water Construction: 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.	(08 Hrs)
Unit-III	Earth Work Machineries: 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, Sheepfoot Roller, Pneumatic-tyred Roller, Vibrating Compactors, Vibrocompaction methods. Finishing equipment.	(08 Hrs)
Unit-IV	Hoisting & Conveying Equipments: 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.	(08 Hrs)
Unit-V	Equipment Management & Economics: 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.	(08 Hrs)
Unit-VI	Dewatering, Paving Equipments & Concrete Pumps: 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.	(08 Hrs)

Internal Assessment:

Unit Test -1 UNIT – I, II, III

Unit Test -2 UNIT – IV,V,VI

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

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.

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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).

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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.

COURSE: FLUID MECHANICS

TEACHING SCHEME:

Theory: 04 Hours / Week

Practical: 02 Hours / Week

EXAMINATION SCHEME:

Semester End Examination: 60 Marks

Internal Assessment: 40 Marks

Term Work & Oral : 50 Marks

CREDITS:

Theory: 04

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 :

(08 Hrs)

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.

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Unit-II	Kinematics	(08 Hrs)
	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.	
Unit-III	Energy Relationships	(08 Hrs)
	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..	
Unit-IV	Dimensional Analysis and Model Studies	(08 Hrs)
	Dimensional homogeneity, important dimensionless parameters, Dimensional analysis using Buckingham's theorem, Model studies, Similitude, Model laws, Types of models.	
Unit-V	Fundamental of Pipe Flow & Boundary layer theory	(08 Hrs)
	Reynolds experiment, Classification of Flows based on Reynolds Number, Moody's Diagram, Laminar flow in circular pipe, Hagen Poissullies 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 boundary layer, Boundary layer thickness, Velocity distributions within boundary layer	
Unit-VI	Turbulent flow & Pipe Flow Problems	(08 Hrs)
	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.	

Internal Assessment:

Unit Test -1 UNIT – I, II, III

Unit Test -2 UNIT – IV, V, VI

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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 Cd of Venturimeter
- 6 Calibration of Cd of Orifice
- 7 Calibration of Cd 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.

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Reference Books:

- 1 Garde R. J. and Mirajgaonkar “Engineering Fluid Mechanics” ScitechPulication
- 2 C.P.Konhadraman “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.

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- 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

COURSE: ECONOMICS & FINANCE

TEACHING SCHEME:

Theory: 03 Hours / Week

EXAMINATION SCHEME:

Semester End Examination: 60 Marks

Internal Assessment: 40 Marks

CREDITS:

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:

(06 Hrs)

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

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Unit-II	Cash Flow:	(06 Hrs)
	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.	
Unit-III	Project Economics and Analysis:	(06 Hrs)
	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	
Unit-IV	Depreciation and Value Engineering:	(06 Hrs)
	Depreciation and methods of depreciations. Inflation, value engineering and value analysis	
Unit-V	Financial Management:	(06 Hrs)
	Financial management, construction accountancy charts of accounts, financial statement, profit and loss account, balance sheet of construction Industry.	
Unit-VI	Project Budgeting:	(06 Hrs)
	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,	

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

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

- 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.

COURSE: CONCRETE TECHNOLOGY

TEACHING SCHEME:

Theory: 04 Hours / Week

Practical: 02 Hours / Week

EXAMINATION SCHEME:

Semester End Examination: 60 Marks

Internal Assessment: 40 Marks

Term Work & Oral: 50 Marks

CREDITS:

Theory :04

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:

(08 Hrs.)

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.

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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 mix concrete.	(08 Hrs.)

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Unit-VI Concrete Mix Design:

(08 Hrs.)

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.

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

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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.

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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.

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

TEACHING SCHEME:

Practical: -- Hours / Week

EXAMINATION SCHEME:

Term Work & Oral: 50 Marks

CREDITS:

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:

(8 Hrs)

Overview of Revit Architecture Interface, Starting Projects, Viewing Commands, Introduction to Architectural working drawing, Representing Standard base 2D drafting

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Unit-II	Basic Drawing in Revit:	(8 Hrs)
	Drawing Elementary CADD command - Line, Polyline, Polygon, Circle, Polyline, arc, ellipse, Text- Single Text, Multitext, Dtext, Using General Drawing Tools, Editing Elements using tools	
Unit-III	Using Modify Tools in Revit:	(8 Hrs)
	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	
Unit-IV	Modelling in Revit:	(8 Hrs)
	Modelling Walls, Doors and Windows, Floors, Stairs, Railing, Preparing utilization of architectural working drawing	
Unit-V	Model Rendering:	(8 Hrs)
	Practice on 3D drawing & designing, Rendering of 3D model (Light, Material & Landscaping)	
Unit-VI	Introduction to BIM:	(8 Hrs)
	Software Tools, BIM and Project Delivery, BIM and Cost Estimating	

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

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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.

COURSE: CIVIL ENGINEERING SOFTWARE – II (AUTOCAD 3D)

TEACHING SCHEME:

Practical: 04 Hours / Week

EXAMINATION SCHEME:

Term Work & Oral: 75 Marks

CREDITS:

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:

(8 Hrs)

Introduction to AutoCAD 3D, Creating solid primitives, Mesh primitives

Working in 3D, Commands for Editing in AutoCAD 3D

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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

COURSE: DATA ANALYTICS USING PYTHON

TEACHING SCHEME:

Practical: 02 Hours / Week

EXAMINATION SCHEME:

Term Work: 25 Marks

CREDITS:

TW: 01

Course Pre-requisites:

The students should have knowledge of

- 1 Basics of functional and object-oriented Programming

Course Objective:

To develop analytical skills among the students using data analysis methods and Python.

Course Outcomes:

The student will be able to

- 1 Write program of functional and object-oriented Python.
- 2 Visualize Data.
- 3 Design, analyse & validate linear and multiple linear regression model on given data.
- 4 Design and test hypothesis using ANOVA for given data.
- 5 Design, analyse & validate non-linear regression model.
- 6 Analyse time series data.

Course Content:

Unit-I Introduction to Python Programming:

(08 Hrs)

Python programming environment, statements, Expressions, Flow Controls, Functions, Numeric Types, Sequences and Class Definition, Constructors, Text & Binary Files - Reading and Writing.

Visualization in Python: Matplotlib package, Plotting Graphs, Controlling Graph, Adding Text, More Graph Types, Getting and setting values, Patches.

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

Unit-II	Descriptive Statistics:	(08 Hrs)
	type of data- univariate bivariate and multivariate. Descriptive measures - central tendency and dispersion. Bivariate data-Summarization, marginal and conditional frequency distribution. Regression and correlation. Least squares method. Rank correlation. Graphical representation, Frequency curves, Scatter diagram.	
Unit-III	Inferential Statistics:	(08 Hrs)
	Random sampling. Finite and infinite populations & sampling. Estimates and standard error, Measure of Variability. Sampling with replacement and sampling without replacement, Sampling distribution of sample mean, stratified random sampling	
Unit-IV	Probability Theory:	(08 Hrs)
	concept of experiments, sample space, event. Definition of Combinatorial Probability. Conditional Probability, Bayes Theorem. Probability distribution: Type of data, Bernoulli Distribution, Uniform Distribution, Binomial Distribution, Normal Distribution, Poisson Distribution, Exponential Distribution. Visualization of distribution.	
Unit-V	Linear regression:	(08 Hrs)
	Linear regression model, Model assumptions, Validation of model and model assumptions. Multiple regression: Multiple linear regression model, Model assumptions, Validation of model and model assumptions. Analysis of variance (ANOVA): Assumptions, one-way, two-way ANOVA with as well as without interaction.	
Unit-VI	Non-Linear Regression:	(06 Hrs)
	Non-linear regression model, Validation of model and model assumptions. Examination of non-linearity, initial estimates. Basics of Time Series Analysis: Stationary, ARIMA Models: Identification, Estimation and Forecasting.	

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

Term Work:

The term-work shall consist of -

- 1 Write a program to perform basic operations using Python Functions.
- 2 Write a program to perform to read, write and modify text file data using OO Python.
- 3 Exercise different functionalities of Matplotlib package.
- 4 Write a program to measure central tendency and dispersion of given data.
- 5 Write a program to measure of variability for given sample and population.
- 6 Write a program to implement Bayes Theorem.
- 7 Write a program to visualize different types of distributions.
- 8 Write a program to develop linear and multiple regression model.
- 9 Write a program to perform Analysis of variance.
- 10 Write a program to develop non-linear regression model.

Reference Books:

- 1 Wes Mc Kinney. "Python for Data Analysis", O'Reilly Media, Inc.
- 2 Tim Hall and J-P Stacey "Python 3 for Absolute Beginners", A press.
- 3 Jake Vander Plas, "Python Data Science Handbook: Essential Tools for Working with Data" O'Reilly Media
- 4 David Spiegel halter "The Art of Statistics" Pelican

Course: Vector Calculus and Differential equations

TEACHING SCHEME:

Theory: 3 Hours / Week

EXAMINATION SCHEME:

End Semester Examination: 60 Marks

Internal Assessment: 40 Marks

CREDITS ALLOTTED:

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

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

Course Content:

UNIT - I Linear Differential Equations (LDE) (06 Hrs.)

Solution of nth order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy's & Legendre's DE, Solution of Simultaneous & Symmetric Simultaneous DE.

UNIT - II Applications of DE (06 Hrs.)

Modeling of problems on bending of beams, whirling of shafts and mass spring systems. Applications of ODE to problems of Civil and allied engineering

UNIT - III Applications of PDE (06 Hrs.)

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

UNIT - IV Vector Differential Calculus (06 Hrs.)

Physical Interpretation of Vector Differentiation, Vector Differential Operator, Gradient, Divergence and Curl, Directional Derivative, Solenoidal, Irrotational and Conservative Fields, Scalar Potential, Vector Identities

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 (06 Hrs.)

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.

Unit Tests:

Unit Test I: Unit I to Unit III

Unit Test II: Unit IV to VI

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

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

Course: Open Channel Flow and Hydraulic Machinery

TEACHING SCHEME:

Theory: 04 Hours / Week

Tutorial: 02 Hours/week

EXAMINATION SCHEME:

Semester End Examination: 60 Marks

Internal Assessment: 40 Marks

Term Work & Oral : 50 Marks

CREDITS:

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.

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

Course Content:

UNIT - I Uniform Flow in Open Channels Basic Equations: **(08Hrs)**

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.

UNIT - II Gradually Varied Flow in Open Channels (08Hrs)

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

UNIT - III Rapidly Varied Flow (08Hrs)

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

UNIT - IV Unsteady Flow (08Hrs)

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 Classification. Fluid Flow around Submerged Bodies: Practical problems involving fluid flow around submerged bodies, Definition & Expression for Drag, lift, drag coefficient, Types of Drag.

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

UNIT - V Impact of Jet and Turbines

(08Hrs)

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.

UNIT - VI Centrifugal Pump

(08Hrs)

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.

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

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

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, Zani Alimuddin, “Basic Fluid Mechanics and Hydraulic Machines”
BSP Books Pvt. Ltd.

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

Reference Books

- 1 Fox, McDonald, Pritchard, “Fluid Mechanics SI Version” Wiley 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 – II (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

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

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, Boussinesq'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.

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

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.

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- 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.

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

10. Prepare the chart for soil water and permeability of soil.
11. Draw the flow net for sheet pile or earthen 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.

COURSE: ANALYSIS OF DETERMINATE STRUCTURES

TEACHING SCHEME:

Theory: 03 Hours / Week

Tutorial: 01 Hour / Week

EXAMINATION SCHEME:

Semester End Examination: 60 Marks

Internal Assessment: 40 Marks

CREDITS:

Theory: 03

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.

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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

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

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

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

- 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:

Theory: 04 Hours / Week

Practical: 02 Hours / Week

EXAMINATION SCHEME:

Semester End Examination: 60 Marks

Internal Assessment: 40 Marks

Term Work & Oral: 50 Marks

CREDITS:

Theory: 04

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:

(08 Hrs)

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.

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

UNIT - II Planning & Scheduling: (08 Hrs)

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

UNIT - III Network Analysis: (08 Hrs)

Critical Path Method (CPM), Types of Floats, Program Evaluation, and Review Technique (PERT), Time Computations, Slack.

UNIT - IV Project Monitoring & Control (08 Hrs)

Resource Allocation, Resource Smoothing and Leveling, Crashing of Network, Direct Cost and Indirect Cost, Cost Slope, Updating of Network.

UNIT - V Material Management: (08 Hrs)

Objectives of material management, material requirement, scheduling, monitoring, inventory control, inventory classification, inventory management, inventory models, economic order quantity, ABC analysis.

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

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

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 Construction project.

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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.

Plumbing Engineering

TEACHING SCHEME:

Practical: -- Hours / Week

EXAMINATION SCHEME:

Term work& Oral: 50 Marks

CREDITS ALLOTTED:

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

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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 reservoir Sizing, Elevated Roof Tank (storage cistern) or Overhead tank Sizing, Cold Water Pipe Sizing in Building as per flow rate and fixture Unit Method (WFU), Minimum number of smaller diameter water pipes that can be connected to bigger pipes. Plumbers Chart for Pipe Sizing, Box Formula, Booster pump sizing & transfer, Pump Sizing (HP Watts), Auto Pneumatic, System & Pressure Tank Sizing, External Water Supply, Pipe Sizing, Pump Room Design with valve connection detail, Design of External Water System

Gray Water System: Grey water cycle, Water Tank Sizing, Booster Pump Calculation, Grey water pipe sizing, Flush Water, Potable and non potable loop pipe sizing (Software).

Hot Water System: Hot Water System Designing, Estimating Hot Water Demand, 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 and Down Feed System, Solar Water heater (Energy Saving Calculation).

Irrigation System: Garden Water Supply and Fountain, Garden Water Supply and Fountain pipe sizing, Calculation of storage tank, Garden water fountain designing & pump selection

Drainage System: Soil and Waste water drain calculation in building vertical stack, Branch drain / Discharge pipe, horizontal drain, Fixture unit rating, Maximum number of discharge unit allowed in stack, Design of horizontal 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 and Grease Interceptor Designing, Designing of common appurtenances, Inspection Chambers and Junction manholes, External foul water drainage for building.

Storm water System: Designing of Storm water Drainage system in building, Sizing of Rain Water Gutters, External Storm water drainage system Designing.

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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

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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

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)

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- 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.

Course: Civil Engineering Software III HEC-RAS

TEACHING SCHEME:

Practical: 04 Hours / Week

EXAMINATION SCHEME:

Term Work & Oral: 50 Marks

CREDITS:

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.

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- 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.

B. Tech. – 2021 Course
Rules and Regulations

B. Tech. – 2021 Course

Rules and Regulations

(I) Theory

(A) Theory Examination

Theory examination consists of: (i) End semester examination (ESE), and (ii) Internal assessment (IA).

(i) ESE is of 60 marks for theory courses.

(ii) IA is of 40 marks. Out of 40 marks, 20 marks will be for Unit Tests and 20 marks will be for Project Based Learning for a given course. Two Unit Tests, each of 20 marks, will be conducted. Average of marks obtained in these two unit tests will be considered as UT marks. Roll numbers allotted to the students shall be the examination numbers for the conduction of unit tests.

(B) Standard of Passing

(i) There is a separate passing of 40% of 60 marks, i.e. 24 marks, for ESE for a given course.

(ii) There is a separate passing of 40% of 40 marks, i.e. 16, for IA for a given course.

(iii) A student who fails at ESE in a given course has to reappear only at ESE as a backlog student and clear the head of passing. Similarly, a student who fails at IA in a given course has to reappear only at IA as a backlog student and clear the head of passing

(II) Practical

(A) Practical Examination

Practical examination consists of: (i) Term work, and (ii) Practical/Oral examination for a given course based on term work.

(i) Term work (TW): TW marks are as mentioned in the curriculum structure.

(ii) Practical/Oral (PR/OR): PR/OR marks are as mentioned in the curriculum structure.

(B) Conduction of practical/oral examination

(i) A student will be permitted to appear for practical/oral examination only if he/she submits term work of a given course.

(ii) Practical/oral examination shall be conducted in the presence of internal and external examiners appointed by university.

(B) Standard of Passing

(i) A student shall pass both heads TW and PR/OR separately with minimum 40% of total marks of respective head.

(III) MOOC and Social Activity Course

(i) If a student completes one MOOC during a programme, he/ she will earn additional TWO credits, subjected to submission of the certificate of completion of the respective course. It is mandatory for a student to complete atleast two MOOC to obtain degree in a given discipline. Students shall register to MOOCs which are offered by any one the following agencies:

(a) SWAYAM : www.swayam.gov.in

(b) NPTEL : www.onlinecourse.nptel.ac.in

(c) Course Era : www.coursera.org

(d) edX online learning : www.edx.org

(e) MIT Open Course ware : www.ocw.mit.edu

(f) Udemy : www.udemy.com

(g) Spoken tutorial : www.spoken-tutorial.org

(ii) If a student completes social activity, he/she will earn additional TWO credits, subjected to submission of the certificate of completion of the respective course/ activity from the relevant authorities. It is mandatory for a student to complete atleast one social activities to obtain degree in a given discipline.

(iv) The additional credits for MOOC and Social Activity will be given only after verification of the authentic document by the Head of the Department and a separate mark-sheet will be submitted by the Head of the Department along with the course examiner.

(IV) A. T. K. T

(i) A student who is granted term for B. Tech. Semester-I, III, V, VII will be allowed to keep term for his/her B. Tech. Semester-II, IV, VI, VIII examination, respectively even if he/she appears and fails or does not appear at B. Tech. Semester-I,III, V, VII examination respectively.

(ii) A student shall be allowed to keep term for the B. Tech. Semester-III course if he/she has a backlog of any number of Heads of passing at B. Tech. Semester-I & II taken together.

(iii) A student shall be allowed to keep term for the B. Tech. Semester-V of respective course if

he/she has no backlog of B. Tech. Semester-I & II and he/she has a backlog of any number of Heads of passing at B. Tech. Semester-III & IV taken together.

(iv) A student shall be allowed to keep term for the B. Tech. Semester- VII of respective course if he/she has no backlog of B. Tech. Semester-I, II, III, IV and he/she has a backlog of any number of Heads of passing at B. Tech. Semester-V & VI taken together.

(V) Grade Point, Grade Letter and Equivalent Marks

The student must obtain a minimum Grade Point of 5.0 (40% marks) in ESE and also in combined ESE + IA. A student who fails in ESE of a course has to reappear only to ESE as a backlog student and clear that head of passing.

Award of the Class for the Degree considering CGPA: A student who has completed the minimum credits specified for the programme shall be declared to be passed in the programme. The CGPA will be computed every year of all the courses of that year. The grade will be awarded according to the CGPA of every year.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent range of Marks (%)
$9.50 \leq \text{CGPA} \leq 10.00$	O	Outstanding	$80 \leq \text{Marks} \leq 100$
$9.00 \leq \text{CGPA} \leq 9.49$	A+	Excellent	$70 \leq \text{Marks} < 80$
$8.00 \leq \text{CGPA} \leq 8.99$	A	Very Good	$60 \leq \text{Marks} < 70$
$7.00 \leq \text{CGPA} \leq 7.99$	B+	Good	$55 \leq \text{Marks} < 60$
$6.00 \leq \text{CGPA} \leq 6.99$	B	Average	$50 \leq \text{Marks} < 55$
$5.00 \leq \text{CGPA} \leq 5.99$	C	Satisfactory	$40 \leq \text{Marks} < 50$
CGPA below 5.00	F	Fail	Marks Below 40