Bharati Vidyapeeth

(Deemed to be University)

Pune, India

College of Engineering, Pune

Program Curriculum

B.Tech (Civil Engineering)-2021

Sem – I & II

(w.e.f. from 2021-22)

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 (Deemed to be University)

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

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 contents 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 curiculum 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 rolels.

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 recieves 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**

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

Program: B. Tech. Civil Sem: I 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.		Differential Calculus	4	-	1	60	40	-	-	-	100	4	-	1	5
2.		Acoustics and Modern Physics	3	2	-	60	40	25	-	-	125	3	1	-	4
3.		Construction and Materials	4	2	-	60	40	-	50	-	150	4	1	-	5
4.		Civil Engineering Structures an Geology	4	2	-	60	40	-	-	50	150	4	1	--	5
5.		Introduction and Opportunities in Civ Engineerin	3	-	-	60	40	-	-	-	100	3	-	--	3
6.		Graphics for Civil Engineers	-	2	-	--	--	-	50	-	50	-	1	--	1
7.		Workshop Technology	-	2	-	--	--	50	-	-	50	-	1	--	1
8.		Fundamentals of Problem Solvir Logic (Using C	-	2	-	--	--	25	-	-	25	-	1	--	1
		Total	18	12	1	300	200	100	100	50	750	18	6	1	25

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

Program: B. Tech. Civil Sem: II 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.		Integral Calculus	4	-	1	60	40	-	-	-	100	4	-	1	5
2.		Applied Chemistry	3	2	-	60	40	25	-	-	125	3	1	-	4
3.		Statics and Dynamics	4	2	-	60	40	25	-	-	125	4	1	-	5
4.		Basic Land Surveying	4	2	-	60	40	-	-	75	175	4	1	-	5
5.		Construction Design & Drawing	3	2	-	60	40	-	50	-	150	3	1	-	4
6.		Civil Engineering Software – I (AutoCAD)	-	2	-	-	-	-	-	50	50	-	1	-	1
7.		Object Oriented Programming (Using C++)	-	2	-	-	-	25	-	-	25	-	1	-	1
	Total		18	12	1	300	200	75	50	125	750	18	6	1	25

*Theory paper of 4 hours duration

Course: Differential Calculus

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 4 Hours / Week	End Semester Examination: 60 Marks	Theory: -04
	Internal Assessment: 40 Marks	
Tutorial: 1 Hour / Week		Tutorial: - 01

Course Pre-requisites:

The students should have knowledge of

1 Algebra of matrices and its Determinants, Maxima and Minima of single variable functions.

Course Objectives:

To study

1. Fundamental theorems, concepts in Matrices, Demoivr's theorem and its applications in engineering.
2. Various techniques in Calculus, Explanation of functions and Infinite series.
3. Partial differentiation, maxima, minima and its applications in engineering.

Course Outcomes:

The student will be able to

1 Understand rank of matrix and apply it to solve system of linear equations

2 Understand the DeMoiver's theorem, hyperbolic functions and apply it in engineering problems.

3 Understand the Leibnitz's rule and apply it to find nth derivative of a function.

4 Understand fundamental concepts of convergence, divergence of infinite series and its tests.

5 Understand the concept of partial differentiation and apply it to find total derivative.

6 Evaluate the maxima and minima of any two variables functions.

Course Content:

UNIT - I Matrices: (08 Hrs)

Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations. Eigen values, Eigen Vectors.

UNIT - II Complex Numbers and Applications: (08 Hrs)

Definition, Cartesian, Polar and Exponential Forms, Argand's Diagram, De'Moivre's theorem and its application to find roots of algebraic equations., Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.

UNIT - III Differential Calculus: (08 Hrs)

Differential Calculus: Successive Differentiation, nth Derivatives of Standard Functions, Leibnitz's Theorem.

Expansion of Functions: Taylor's Series and Maclaurin's Series.

UNIT - IV Differential Calculus: (08 Hrs)

Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits.

Infinite Series: Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence, Absolute and Conditional Convergence, Power series, Range of Convergence.

UNIT - V Partial Differentiation and Applications: (08 Hrs)

Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables

UNIT - VI Jacobian: (08 Hrs)

Jacobians and their applications, Chain Rule, Functional Dependence.

Maxima and Minima: Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.

Internal Assessment

Unit Test: I and II

Textbooks:

1. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar, (Pune Vidyarthi Griha Prakashan, Pune), 7th Edition, 1988,Reprint 2010.
2. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi),42th Edition, 2012.

Reference Books:

1. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill), Edition ,2008.
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition, 1999, Reprint 2010.
3. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning), Edition 2007
4. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education), 2nd, Edition, 2002.

Project Based learning topics for Differential Calculus:

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. Echelon form
2. Normal form
3. Linear and orthogonal transformation
4. Eigen values and eigen vectors
5. Argand diagram
6. De Movre's theorem
7. Hyperbolic and logarithmic functions
8. Leibnitz theorem
9. Taylor's theorem
10. L'Hospital rule
11. Tests for convergence
12. Euler theorem for homogeneous functions
13. Total derivative
14. Maxima and minima for two variable function
15. Langrage undetermined multipliers

Course: Acoustics and Modern Physics

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 3Hours / Week	End Semester Examination: 60 Marks	
	Internal Assessment: 40 Marks	Theory: 3
Practical: 2 Hours / Week	Term Work: 25Marks	Term Work :1
		Total: 4

Course Pre-requisites:

The students should have knowledge of

1 Basic understanding of physics and calculus.

Course Objectives:

To impart knowledge of basic concepts in physics relevant to engineering applications in a broader sense with a view to lay foundation for the Civil Engineering.

Course Outcomes:

The student will be able to

1 Summarise the terms damping constant, characteristic frequency, kinetic and potential energy of a spring.

2 Relate the problems associated with architectural acoustics and give their remedies.

3 Connect the problems associated with defects and use ultrasonic as a tool in industry for non-destructive testing.

4 Summarise and solve the engineering problems on Electromagnetism.

5 Correlate the principles of different types of polarization and structural phase transitions phenomena in ferroelectric systems.

6 Infer the wave nature of light and apply it to measure stress, pressure and dimension etc.

Course Content:

UNIT - I Waves and oscillation (06 Hours)

Periodic motion, simple harmonic motion, characteristics of simple harmonic motion, vibration of simple springs mass system (Different combinations), Resonance - definition, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators

UNIT - II Architectural Acoustics (06 Hours)

Elementary acoustics, Limits of audibility, Audibility curve, Noise and musical sound, timbre, Reverberation and reverberation time, Sabine's formula (without Derivation), Intensity level, Sound intensity level, Loudness, Sound absorption, Sound absorption coefficient, different types of noise and their remedies, Sound absorption materials, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies.

UNIT - III Ultrasonic & NDT (06 Hours)

Introduction to ultrasonic, Production of ultrasonic by magnetostriction and piezoelectric methods

Classification of Non-destructive testing methods, Principles of physics in Non-destructive Testing, Advantages of Non-destructive testing methods, Acoustic Emission Testing, Ultrasonic (thickness measurement, flaw detection), Radiography testing.

UNIT - IV Electromagnetic Wave (06 Hours)

Displacement current, Maxwell's equations (derivation), Wave equation for electromagnetic waves, Propagation in free space, Poynting theorem, Characteristic of Transverse electric and magnetic waves, Skin depth, Rectangular and circular waveguides.

UNIT - V Engineering Materials and Applications (06 Hours)

Paramagnetic materials, diamagnetic materials, ferromagnetic materials, Dielectrics and electric polarisation.

Liquid crystals: Noematic, Semitic and cholesteric phases, Liquid crystal display.

Multiferroics: Type I & Type II multiferroics and applications, Magneto resistive Oxides: Magnetoresistance.

UNIT - VI Wave optics (06 Hours)

Interference

Interference of waves, interference due to thin film (Uniform and nonuniform), Applications of interference (optical flatness, interference filter, non-reflecting coatings.

Diffraction

Introduction, Classes of diffraction, Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Plane diffraction grating, Conditions for principal maxima and minima

Polarisation

Introduction, Double refraction and Huygens's theory, Positive and negative crystals, Nicol prism, Dichroism.

Internal Assessment:

Part- A UNIT TEST – I and II

Part- B

Assignments: Six assignments to be given by the subject teacher (Theory)-one from each unit/one mini project with report-students can work in group of 4 Maximum

Term Work:

The term-work shall consist of any eight of the following.

1. Oscillation of a Spring - Mass System and a Torsional Pendulum
2. To study normal modes of oscillation of two coupled pendulums and to measure the normal mode frequencies.
3. To study normal modes of transverse vibration of a stretched string
4. Study of resonance in LCR circuit
5. To determine the velocity of sound
6. Measurement of average SPL across spherical wave front and behavior with the distance
7. Expansion chamber muffler: investigation of muffler response as a filter in the low frequency approximation by determining insertion loss.
8. Interference of sound using PC speakers
9. Determination of velocity of sound in liquid by ultrasonic interferometer
10. Ultrasonic probe - a study
11. Plotting the hysteresis loop for given magnetic material
12. Determination of radius of planoconvex lens/wavelength of light/Flatness testing by Newton's rings
13. Determination of wavelength of light using diffraction grating
14. Determination of resolving power of telescope
15. Determination of thickness of a thin wire by air wedge
16. Determination of refractive index for O-ray and E-ray

Textbooks:

1. A Textbook of Engineering Physics, M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy, S. Chand Publishing (2018)
2. Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publishing Co Pvt Ltd (2015)
3. Concepts of Modern Physics, Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, McGraw Hill Education (2017)

Reference Books:

1. Fundamentals of Physics, Jearl Walker, David Halliday and Robert Resnick, John Wiley and Sons (2013)
2. Optics, Francis Jenkins and Harvey White, Tata Mcgraw Hill (2017)
3. Principles of Physics, John W. Jewett, Cengage publishing (2013)
4. Introduction to Solid State Physics, C. Kittel, Wiley and Sons (2004)
5. Principles of Solid-State Physics, H. V. Keer, New Age International (1993)
6. Laser and Non-Linear Optics, B. B. Laud, New Age International Private Limited (2011)
7. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni, Capital Publishing Company (2014)
8. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan, New Age International Pvt. Ltd. (1997)
9. Introduction to Electrodynamics –David R. Griffiths, Pearson (2013)
10. Renewable Energy: Power for a Sustainable Future, Boyle, Oxford University Press (2012)
11. Fundamentals of Physics, Jearl Walker, David Halliday and Robert Resnick, John Wiley and Sons (2013)

Topics for project-based Learning for Acoustics and Modern Physics

1. Measurement and effect of environmental noise in the college
2. Design and simulation of automatic solar powered time regulated water pumping
3. Solar technology: an alternative source of energy for national development
4. Double pendulum and its application
5. Comparison of various method used in measuring the gravitational constant g
6. The physics of stars and their astronomical identification
7. Design and construction of digital distance measuring instrument

8. Electronic eye (Laser Security) as autoswitch/security system
9. Electric power generation by road power
10. Measurement /simulation of reverberation time
11. Study of vibration of bars
12. Determination of absorption coefficient of sound absorbing materials
13. Determination of velocity of O-ray and E-ray in different double refracting materials
14. Need of medium for propagation of sound wave
15. Small wind turbines as a source of electricity

Course: Construction and Materials

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 4Hours / Week	End Semester Examination: 60 Marks	
	Internal Assessment: 40 Marks	Theory: 4
Practical: 2 Hours / Week	Term Work & OR: 50 Marks	Term Work & OR: 1
		Total:5

Course Pre-requisites:

The students should have knowledge of

1 Basic concepts of Engineering Drawing

Course Objectives:

To develop the knowledge of building components, materials and construction practices

Course Outcomes:

The student will be able to

1 Elaborate the types of structures and components of building
2 Explain building foundation, types of masonry
3 Identify the types of doors, windows and design various staircases
4 Select and apply the proper type of floors and types of roofs
5 Illustrate the types of plasters, pointing and paints
6 Apply the proper formwork and scaffolding, use proper construction safety

Course Content:

UNIT - I Civil Engineering materials and Building Components (08 Hours)

Civil Engineering scope, Types of Building as per National Building Code and role of Civil engineer; Types of structures based on loading, material and configuration (all types of construction materials); Building components and their functions

UNIT - II Building Foundation, Masonry and Material (08 Hours)

Foundation: Types – Shallow foundation and Deep foundation, Suitability of foundations, failure of foundation and its causes.

Stones and Stone Masonry: Requirement of good building stones, Stone masonry-principal terms, types (Random Rubble, Uncoursed Rubble, Coursed Rubble and Ashlar Masonry)

Brickwork and Brick masonry: Characteristics of Bricks, IS Specification of Bricks, Classifications of bricks (Silica, refractory, fire and Fly ash bricks), Types of bonds: English, Flemish, Header, Stretcher.

UNIT - III Doors, Windows and Staircase (08 Hours)

Doors: Definition and terminology, Installation of doors frames, Types of Doors: Glazed or sash door, flush door, louvered door, collapsible doors, revolving doors, sliding doors, swing doors.

Windows: Definition and terminology, Types of window: Casement window, Sliding Window, Louvered or venetian window, gable window, skylight window, Ventilators.

Stairs: Classification, Terminology used, Types: Straight staircase, Open well stair, quarter turn stairs, half turn stairs, turning staircase, dog legged staircase, circular stairs, Bifurcated stairs and spiral stairs, Details of Ramps, Lifts and Escalators.

Lintels: Types, Details of R.C.C. lintels and chajja.

UNIT - IV Floors and Roofs (08 Hours)

Flooring: I.S. Specifications, Types of floor finishes and suitability, Construction details of (mud, concrete, brick and stone flooring), Factors for selection of flooring, types of flooring: Timber flooring, tiled flooring, ceramic flooring, mosaic flooring, Industrial flooring: tremix or Vacuum Dewatered Flooring (VDF)

Roofs: Types, Suitability, Roof structures, Selection of roof covering material, Methods of water proofing of roofs, Types of trusses, Fixtures & fastenings.

UNIT - V Building Finishes (08 Hours)

Plastering: Methods, tools used, Mortars, Defects, Plaster types: Lime plaster, cement plaster, gypsum plaster, Plaster of Paris and applications

Pointing: Purpose and Types of pointing, Methods of pointing.

Paints: Types and applications, Textures, Apex, Plastic emulsion

Wall cladding: Materials, method of fixing, wall papering and glazing work.

UNIT - VI Formwork, Scaffolding and Safety in construction (08 Hours)

Formwork: Necessity, Materials, Factors for selection, Types

Scaffolding: Necessity, Materials, Factors for selection

Safety in Construction: safety on site, storage of materials, construction safety, prevention of accidents, fire proof construction, repairs and maintenance.

Internal Assessment:

Part- A UNIT TEST- I :- UNIT – I, II, III

UNIT TEST II :- UNIT- IV,V,VI

Part- B Assignments:

Students should perform theoretical / experimental assignment/s from the list below

1) Types of structures and building components
2) Building foundations, Stone and Brick Masonry
3) Design of staircase.
4) Floors and roofs
5) Building finishes
6) Formwork, scaffolding and Safety in construction

Term Work:

Part- A

The term-work shall consist of minimum Five drawing sheets from list below.

1) Lettering, Symbols, Types of line and dimensioning
2) Foundation: Isolated, Combined footings, Under Reamed Piles, Rafts
3) Type of stone masonry: Elevation and Sectional Drawing
4) Types of Brick Masonry:
5) Types of Doors and windows:
6) Types of stairs: plan and sectional drawing
7) Trusses: Various types of Trusses
8) Site Visit: To understand Various building Material and their use.

Text Books:

1. "Building Construction"-Rangwala,Charotar Publication
2. "The Text Book of Building Construction"-S.P.Arora&S.P.Bindra-DhanpatRai Publication
3. "Building Technology and Valuation"- TTTI Madras, -- Tata McGraw Hill Publication
4. "Building Construction" by B.C.Punmia, Laxmi Publications.

Reference Books:

1. "My Construction Practices" R.B.Chaphalkar
2. "A to Z" Building Construction" Mantri Publications
3. "Materials of Construction" – Ghose- Tata McGraw Hill Publications
4. "Civil engineering Material'- TTTI Chandigarh- Tata McGraw Hill Publications
5. 'Building Material Technology by Ruth T. Brantly& L Reed Brantley, Tata McGraw Hill
6. Building Materials by S.K.Duggal, New Age International Publishers.

e-Resources

1. https://nptel.ac.in/course.html
2. https://theconstructor.org/write-for-us/
3. https://www.engineerwing.com/2012/10/tremix-flooring.html
4. http://home.iitk.ac.in/~mohite/composite_introduction.pdf

Topics for Project based learning:

1: Model making on various components of buildings, report writing, cost analysis and site visit.
2. Market survey, sample collections and report writing on all types of construction materials.
3. Report on Scope of Civil Engineering in various fields.
4. Collecting various National Building codes and report writing.
5. Model making on Types of Shallow foundations report writing
6. Model making on Types of Deep foundations report writing
7. Sample collections of various types of stones used in stone masonry report writing
8. Model making on Different types of stone masonry (mentioned in syllabus) report writing
9. Model making on various types of Brick bond masonry. (Mentioned in syllabus) report writing

10. Model making on different types of Doors report writing
11. Model making on different types of windows reports writing
12. Model making on different types of staircase report writing
13. Market survey, sample collections and report writing on various roofing materials.
14. The rain roof water-harvesting systems.
15. Site visit, market survey, report writing and cost analysis of various plastering materials.
16. Site visit, market survey, report writing and cost analysis of various types of Paint.
17. Model making on Types of formwork and designs.
18. Model making on various types of Scaffolding and designs.
19. Corrosion mechanism, prevention, and repairs measures of RCC structure.

20 Construction Project Management & Building Information Modelling

Course: Civil Engineering Structures and Geology

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 4 Hours / Week	End Semester Examination: 60 Marks	
	Internal Assessment: 40 Marks	TH:- 4
Practical: 2 Hours / Week	TW and PR :- 50 Marks	TW and PR: 1
		Total: 5

Course Pre-requisites:

The students should have knowledge of

1 Basic engineering sciences.

Course Objectives:

To make the student know the variety of Civil Engineering Structures and the importance of Geology for Civil Engineers.

Course Outcomes:

The student will be able to

1 Identify and know various civil engineering structures based on their function.

2 Identify and know various civil engineering structures based on their behaviour.

3 Identify and know various civil engineering structures based on their performance

4 Students should be able to identify different rocks & minerals.

5 Students should be able to identify different Geological structures to decide location and type of civil engineering structure.

6 Students should be able to carry out preliminary geological investigation for Tunnel, Dam & Bridge.

Course Content:

UNIT - I Structures Based on their Function: (08 Hours)

Types of structures, various functions served by Civil Engineering structures,

Structures used for residential purpose, structures used for water storage and retaining, structures used for industries, structures used for transportation, structures used for treatment of water and wastewater, structures used for storage of liquids, special structures like nuclear reactors, towers, chimneys etc..

UNIT - II Structures based on their behaviour: (08 Hours)

Various behaviours of a structure, Load bearing Structures, Framed Structures, light structures, medium structures, heavy structures, solid structures, tubular structures, cavity walls, shear walls, tall structures, flat slabs, precast and pre-stressed structures.

UNIT - III Structures based on their performance: (08 Hours)

Various performances of a structure-strength, serviceability, Energy conservation, soil conservation from a structure, water conservation from a structure.

oncept of ECO building, green buildings, Intelligent building, Low-Cost Housing, High rise buildings.

UNIT - IV Importance of Geology in Civil Engineering structures. (08 Hours)

Importance of Geology in Civil Engineering structures

Mineralogy and Petrology:

Mineralogy: Formation Process of Minerals, types of minerals, classification of minerals.

Petrology: Igneous rocks-mineral composition, texture, classification of igneous rock.

Secondary rocks- Weathering, texture & structure of sedimentary rocks & its classification.

Metamorphic Rocks-Agents & types of metamorphism, building stones.

UNIT - V Structural Geology & Indian Geology: (08 Hours)

Structural Geology- Outcrop, dip & strike, conformable series, unconformity & overlap, faults & folds in rocks, mode of occurrence of igneous rocks, joints & fractures. Indian Geology- General Principles of stratigraphy, age of the earth & divisions of geological time, physiographic divisions of India & their characteristics, geological history of peninsula, study of formations in peninsula.

UNIT - VI Geological Investigations: (08 Hours)

Preliminary geological investigations surface survey, use of geological maps &sections, subsurface investigation. drill holes, test pits, trenches, exploratory tunnels, shafts, adits, drifts etc. Limitation of drilling, engineering significance of geological structures.

Internal Assessment:

Part- A UNIT TEST – I and II

Part- B **Assignments:** Students should perform theoretical / experimental assignment/s from the list below

1) Types of structures and their functions.
2) Structures based on behavior
3) Structures based on performance
4) Types of minerals & Their physical properties
5) Types of different geological structures
6) Preliminary geological investigation.

Term Work:

a) Review project on any one type of structures
b) Identification of the Minerals (2 Practical)
c) Identification of Igneous rocks (1 Practical)
d) Identification of Secondary rocks (1 Practical)
e) Identification of Metamorphic rocks (1 Practical)
f) Study of Contoured Geological Maps & drawing the sections (Six Practical)
g) Visit to site for understanding the geological features.

Textbooks:

1. S.P. Bindra S.P. Arora, "Building Construction", Laxmi Publication
2. M. L. Shah, C. M. Kale, S. Y. Patki, "Building Drawing with integrated approach to Built Environment", Tata McGraw Hill Publishers
3. Gupte R.B, "A text book of engineering geology",P.V.G. Publications,Pune.

Reference Books:

1. IS provisions "National Building Code"
2. "Development Control Rules" of local plan sanctioning authority
3. Calendar, "Time Saver Standards for Architectural Design", Tata McGraw Hill Publishers
4. Merit, "Building Design and Construction", Tata McGraw Hill Publishers
5. Engineering Geology & General Geology By Parbin singh
6. General Geology & Engineering Geology by Dr.P.T.Sawant, New Delhi Publication.

Topics for project-based Learning for Civil Engineering Structures and Geology

1. Prepare a chart for structures used for Water treatment and sewage treatment plant.
2. Collect the information of various types of structures.
3. Prepare a model or chart for a retaining wall or any hydraulic structures.
4. Prepare a chart for comparison of load bearing and framed structure.
5. Prepare a prototype model for load bearing structure with showing all components.
6. Prepare a chart for various types of soil and water conservation structures.
7. Prepare a model of Bridge structure.
8. Collect the information of high rise building in India and prepare the report.
9. Prepare a chart or prototype model for Eco friendly and Intelligent building.
10. Effect of solid waste on quality of ground water.
11. Geophysical investigation using seismic refraction method to determine causes of real failure.
12. Resistivity methods used in horizontal and vertical discontinuities in the electrical properties of the Ground water.
13. Structural interpretation and mineral potential using remote sensing data and GIS tools.
14. Application of electrical resistivity method in ground water exploration.
15. Types of minerals.
16. Types of igneous rocks.
17. Types of metamorphic rocks.
18. Types of secondary rocks.
19. Texture of rocks.
20. Folds in rocks.
21. Failure in rocks.
22. Structures in rocks.
23. Determination of rock parameters, specific gravity, density and compressive strength of different types of rocks.

Course: Introduction and Opportunities in Civil Engineering

TEACHING SCHEME: **EXAMINATION SCHEME:** **CREDITS ALLOTTED: 3**

Theory: 3Hours / Week End Semester Examination: 60 Marks

Internal Assessment: 40 Marks Theory:3

Course Pre-requisites:

The students should have knowledge of

1 Basic Science

Course Objectives:

To develop the knowledge of Basics of Civil Engineering and Building construction.

Course Outcomes:

The student will be able to

1 Explain the introduction to civil engineering and various discipline.

2 Elaborate Scope and role of civil engineering in all sectors.

3 Identify the Civil Engineering project and process.

4 Select the approvals required for Civil Engineering Construction Projects.

5 Illustrate the Recent Developments in Civil Engineering

6 Apply the Opportunities in Civil Engineering

Course Content:

UNIT - I Introduction to Civil Engineering: (06 Hours)

Introduction to History of Civil Engineering, Definition of Civil Engineering, Various branches of civil Engineering and its application : Structural engineering , Construction engineering , Surveying and mapping engineering, Transportation engineering r, Environmental engineering, Hydraulic and irrigation engineering, Geotechnical engineering, Estimation and coasting ,Project management, Link of Civil Engineering with various discipline of Engineering : Mechanical Engineering, Electrical Engineering, Chemical Engineering, Electronic and Entc, Computer Engineering.

UNIT - II Scope and role of Civil engineering: (06 Hours)

Impact of infrastructural development on the economy of a country, Role of civil engineers, Importance of planning, Scope of Civil engineering in government sector, Scope of civil engineering in private sector, Role of civil engineering in society

UNIT - III Civil Engineering Project and Process: (06 Hours)

Need of project, Estimation cost and benefits of project, Cost-benefit ratio, Conceptual approval, technical planning and project proposal, Administrative approval, Detailed project report, Detailed Estimate of cost, Approvals and NOCs, Tendering and contracts, Terms and conditions, Work allotment, Inspection and quality control, Completion, maintenance, Peoples and organizations involved, Role and responsibility of them, (Owner, Engineers, Architects, Contractor, Consultant, Govt departments)

UNIT - IV Approvals required for Civil Engineering Construction Projects: (06 Hours)

Introduction, Different approvals required for Civil Engineering construction projects, different stages of the projects and approval required at every stage, Authorities for giving approvals, Necessity & Importance of approval, the procedure for approvals

UNIT - V Recent Developments in Civil Engineering (06 Hours)

Introduction to Automation and mechanization in construction industry – Advantages and Disadvantages, Use of Precast and Pre-Fabrication in Civil Engineering Industry, Concept and Elements of SMART cities, Intelligent buildings, concept of low-cost housing, erection techniques of temporary structures.

UNIT - VI Opportunities in Civil Engineering (06 Hours)

Introduction, Types of career roles for Civil Engineers, Certifications for Civil Engineering, Required Skill set for Civil Engineering, Employment Opportunities for Civil Engineers, Career path for Civil Engineers- Government sector, Public sector companies and Own start-ups.

Text Book:

1 "Building Construction"-Rangwala,Charotar Publication

2 "The Text Book of Building Construction"-S.P.Arora&S.P.Bindra-DhanpatRai Publication

3 "Building Technology and Valuation"- TTTI Madras,Tata McGraw Hill Publication

4 "Building Construction" by B.C.Punmia, Laxmi Publications.

Reference Books:

1 "My Construction Practices "R.B.Chaphalkar

2 "A to Z" Building Construction" Mantri Publications

3 IS provisions "National Building Code"

4 "Development Control Rules" of local plan sanctioning authority

5 Calendar, "Time Saver Standards for Architectural Design", Tata McGraw Hill Publishers

6 Merit, "Building Design and Construction", Tata McGraw Hill Publishers

Syllabus For:

Unit Test-I UNIT – I, II, III

Unit Test-II UNIT- IV,V,VI

List of Projects:

Unit: I Introduction to Civil Engineering

1 1.Collection of Structural Information Historical structure of India: Visit, take photos, brows information and prepare report /chart

2 Give day to day examples of Link of Civil Engineering with various discipline of Engineering: Photos in their day-to-day life they see about link of civil engineering with other discipline and write note in their own words on example they have seen (Minimum one example of link with each discipline)

3 branches of Civil Engineer - Structural engineering, Construction

engineering, Surveying and mapping engineering, Transportation engineering r, Environmental engineering, Hydraulic and irrigation engineering, Geotechnical engineering, Estimation and coasting, Project management: collect information on the branch of civil engineer of their choice and submit power point presentation

Unit: II Scope and role of Civil engineering

4 Infrastructural development: Collect information on infrastructural development of country in last 6 years and prepare booklet on it

5 Scope of Civil engineering in government sector: collect information on jobs in government sector, selection criteria process and exams for selection. Make a poster and display on notice board of department

6 Scope of civil engineering in private sector and Role of civil engineering in society: collect information on jobs in private sector, make a poster and display on notice board of department

Unit: III Civil Engineering Project and Process

7 Visit and take a interview of Civil Engineers, Architects, Contractor, Consultant, Govt departments and write your own observations of their work and share in for of class

Unit: IV Approvals required for Civil Engineering Construction Projects

8 Different approvals required for Civil Engineering construction projects: make list of approvals requires brows the information about the process and prepare leaflet (Hard Copy)

9 Authorities for giving approvals: visit any one approval authority of your place and prepare digital chart and mail to all staff and students of Department and take feed back

10 Necessity & Importance of approval, the procedure for approvals: Prepare digital leaflet of necessity & importance of approval, the procedure for approvals and mail it to students and take feed back

Unit: V Recent Developments in Civil Engineering

11 Present your ideas on low coast housing: Students have to build model of low coast house and need to explain its importance

12 Present your ideas on Intelligent building: Students have to build model and explain concept.

13 Present your ideas on Eco-Friendly building: Students have to build model and explain concept

Unit: VI Opportunities in Civil Engineering

14 PPT on Required Skill set for Civil Engineering

15 Own start-ups : Present idea of own start-up in front of class

16 Software in civil engineering and its importance: collect information, download any one free software related to civil engineering and present its working in front of class

17 Study the building structure where you live and write your observation along with photograph

18 Study the traffic, traffic signals, parking on your way to college write your observation along with photograph

19 Study Plumbing system of your house write your observation along with photograph

20 Write a report on waste management in your house with photograph, discuss with your parents and improve waste management of your house.

Course: GRAPHICS FOR CIVIL ENGINEERING

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Practical: 2 Hours / Week	End Semester Examination: --	
	Internal Assessment: --	Credits: --
	Term Work & OR: 50 Marks	Term Work & OR:01
		Total: 1

Course Pre-requisites:

The students should have knowledge of

1 Basics of Mathematics at Secondary School Level.

Course Objectives:

To provide knowledge about

- Fundamentals of engineering drawing and curves
- Isometric views and projection
- Projections of points, lines, planes & solids
- Use of CAD tools.

Course Outcomes:

The student will be able to

1 Understand dimensioning methods and drawing of engineering curves.

2 Draw orthographic projections using 1st angle method of projection*.

3 Draw Isometric views from given orthographic projections*.

4 Draw projection of Lines, its traces and projections of planes*.

5 Draw projection of different solids*.

6 Draw development of lateral surfaces of solids*.

*Using CAD tools

Course Content:

UNIT - I Lines and Dimensioning in Engineering Drawing and Engineering Curves (04 Hours)

Different types of lines used in drawing practice, Dimensioning–linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

Ellipse by Arcs of Circles method, Concentric circles method. Involutes of a circle, Cycloid.

Introduction to Auto CAD commands.

UNIT - II Orthographic Projections (04 Hours)

Basic principles of orthographic projection (First and Third angle method). Orthographic projection of objects by first angle projection method only. Procedure for preparing scaled drawing, sectional views and types of cutting planes and their representation, hatching of sections.

(Using AutoCAD commands).

UNIT - III Isometric Projections (04 Hours)

Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view.

(Using AutoCAD commands)

UNIT - IV Projections of Points & Lines (04 Hours)

Projections of points, projections of lines, lines inclined to one reference plane, Lines inclined to both reference planes. (Lines in First Quadrant Only).

(Using AutoCAD commands)

UNIT - V Projections of Planes (04 Hours)

Projections of Planes, Inclination of the plane with HP, VP.

(Using AutoCAD commands)

UNIT - VI Projections of Solids (04 Hours)

Projection of prism, pyramid, cone and cylinder by rotation method.

(Using AutoCAD commands)

Term Work:

All sheets should complete using AutoCAD.

1. Types of Lines, Dimensioning practice, free hand lettering, 1ndand3rdanglemethodssymbol.
2. Engineering Curves
3. Orthographic Projections
4. Isometric Views
5. Projections of Points and Lines
6. Projections of Planes
7. Projections of Solids

Text Books / Reference Books:

1. "Elementary Engineering Drawing", N. D. Bhatt, Charotar Publishing house, Anand India,
2. "AutoCAD 2020 Beginning and Intermediate", Munir Hamad, Mercury Learning & Information Publication, 2019.
3. "Engineering Drawing and Graphics", Venugopal K., New Age International publishers.

Reference Books

1. "Text Book on Engineering Drawing", K. L. Narayana & P. Kannaiah, Scitech Publications, Chennai.
2. "Fundamentals of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi,
3. "Engineering Drawing", M. B. Shah and B.C. Rana, 1st Ed, Pearson Education, 2005
4. "Engineering Drawing", P. J. Shah, C. Jamnadas and Co., 1st Edition,1988
5. " Engineering Drawing (Geometrical Drawing)", P. S. Gill, 10th Edition, S. K. Katariaand Sons, 2005

WORKSHOP TECHNOLOGY

Teaching Scheme:	Examination Scheme:		Credits Allotted
Theory: - 00 Hours/ Week	End Semester Examination	-------	Theory: 00
Practical: -02 Hours/ Week	IA	--------	
	Term Work	50 Marks	Term Work: 01
	Total	50 Marks	01

Course Pre-requisites: -

Students should have basic knowledge of hand tools used in day to day life.

Course Objectives:

The Student should

1. To acquire the knowledge of basic manufacturing processes.
2. To identify tools, work material and measuring instruments useful for sheet metal, welding, carpentry, plumbing and Piping practice.

Course Outcomes:

The students should be able to

1. Understand the basic Manufacturing Processes used in the industry.
2. Understand various tools and apply suitable tools for suitable operations in civil work.
3. Understand the importance of safety.

Term work shall consist of any three jobs and demonstrations on rest of the trades, journalconsisting of five assignments one on each of the following topics.

Plumbing and Pipe fitting Shop: Study of Pipe joints, Pipe fitting, Cutting, Threading and Laying of pipes. Different tools and equipment like pipe vice, pipe bending machine, dies and die holder, plumbing vice, cutting dies, pipe wrench, ball peen hammer etc. are used for plumbing operations on G.I. pipe.

Welding Shop: Electric arc welding, Study of tools and Operations, Edge preparations, Types of welding joints, Exercises making of various joints. safety practices and general guidelines.

Joining methods: Study of tools and Operations of riveting, Fabrication of toolbox, tray, electrical panel box etc. and study of bolts. joints by bolting etc.

Carpentry Shop: Introduction to wood working, Study of tools and Operations and carpentry joints, Simple exercise using jack plain. To prepare half lap corner joint, mortise and Tennon joints, Simple exercise on woodworking lathe. Safety practices and general guidelines.

Plastic Molding shop: Introduction to plastic molding. types of plastics. types of plastic molding. Exercise on plastic molding machine.

Text Books/ Reference Books

- O.P.Khanna , A Text Book of Welding Technilogy, Dhanpat Rai and Sons
- P.N.Rao , Manufacturing Technology- Vol I, mCgRAW Hill Education 9 India Pvt.
- Chapman W.A.J " Workshop Technology " volume I,II.III, ELBS.
- Hajra Choudhary S.K. , Bose S.K. "Elements of Workshop Technology" Volume I,II
- Begman, Manufacturing Processes.

Course: Fundamentals of Problem Solving Logic(Using C)

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS:
Theory: --		
Tutorial: --	Semester End Examination: --	
	Internal Assessment: --	Credits: --
Practical: 2 Hours / Week	Term Work: 25 Marks	
	Oral: --	Credits: 1

Course Pre-requisites:

The students should have knowledge of

1 Basic knowledge of Computer Handling

Course Objective:

1 To provide an overview of computers and problem-solving methods using 'C' Language

2 To serve as a foundation for the study of programming languages.

Course Outcomes:

The student will be able to

1 Know computer systems

2 Understand concept and steps towards problem solving

3 Understand fundamental concepts of C programming language

4 Use decision control structures

5 Use modular programming approach

6 Use of arrays and structures

Course Content:

UNIT - I Introduction to Computing:

Components of Computer Systems, Concept of hardware and software, Types of software, Concept of computing, data and information, Introduction to computer programming, Types of programming languages, Software Development Life Cycle

UNIT - II Problem solving Techniques:

Steps in problem solving techniques: Define the problem, Formulate the mathematical model, develop an algorithm, Write the code for the problem, Test the program. Introduction to program planning tools- algorithm, flowcharts, pseudo codes

UNIT - III Programming language 'C':

Features of C, basic concepts- header files, compiling and executing a C program, variables, data types, Operators- assignment, arithmetic, relational, logical, increment and decrement, Input and Output functions- print f and scan f

UNIT - IV Decision Control Structures in 'C':

if-else statement, nested if-else, use of logical operators, Loop control structure: for, while, do-while loops, use of break and continue, Case control structure: switch case

UNIT - V Function:

Types of functions, Function definition and declaration, function prototype, calling and returning function, passing values between functions,standard library functions and user defined functions, passing array as function parameter, Recursive function.

UNIT - VI Arrays and structures in 'C':

Concept, declaration, initialization, processing with array, one and multidimensional array, Strings.

Structures in 'C': Concept, declaration, accessing structure elements, Array of structures, Pointer to structures, Uses of structures.

Internal Assessment:

NA

Term Work:

Term-work will consist of following assignments

1 Write a C program to check prime number and even-odd numbers

2 Write a C program to print sum of digits 1 to 10

3 Write a C program to swap two numbers

4 Write a C Program to check whether an alphabet is vowel or consonant

5 Write a C Program to Find the Length of a String without using string functions

6 Write a C program to find area and circumference of circle

7 Write a C program to accept the length of three sides of a triangle and to check triangle as equilateral or not

8 Write a C program to implement linear search technique

Oral/Practical:

NA

Reference Books:

1) Kanetkar, Yashavant P. Let us C. BPB publications, 2004.

2) Brian W. Kernighan, Dennis M. Ritchie, "The C Programming Language", Prentice Hall, ISBN 0131103628, Second Edition

3) Donald E. Knuth, "The Art of Computer Programming", Vols. 1, Addison-Wesley, ISBN13: 978-0201485417, ISBN-10: 0201485419

4) T. E. Bailey, "Program design with pseudo code", Brooks/Cole Publisher, ISBN-10: 0534055745, ISBN-13: 978-0534055745

5) Subrata Saha and Subhodip M., "Basic Computation and Programming with C", Cambridge University of Press, India, ISBN:9781316601853

6) Lamey Robert, "Logical problem solving", Prentice Hall, ISBN: 9780130618825

7) Henry Mullish, Herbert L. Cooper, "The Spirit of C", Thomson Learning, ISBN 0314285008

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

Course: Integral Calculus

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 4 Hours / Week	End Semester Examination: 60 Marks	
	Internal Assessment: 40 Marks	Theory: 4
Tutorial: 1 Hour / Week		Tutorial:-01

Course Pre-requisites:

The students should have knowledge of

1 Student should have Basic Knowledge of differential calculus

Course Objectives:

To study

1. Methods to evaluate first order, first degree differential equations and its applications in engineering problems.
2. Distinct co-ordinate systems, fourier series and curve tracing.
3. Various techniques for integral calculus and its applications in engineering problem.

Course Outcomes:

The student will be able to

1 Understand and evaluate first order and first degree differential equations.

2 Understand the formulation of physical systems as first order, first degree differential equation and evaluate particular solution of it

3 Understand the Fourier series and apply it to represent periodic function

4 Understand and evaluate methods of integral calculus and curve tracing.

5 Understand co-ordinate system and apply it to solve locus problems.

6 Understand concept of multiple integral and apply it to evaluate area, volume, centre of gravity and moment of inertia.

Course Content:

Unit - I **Differential Equations (DE):** **(08 Hrs)**

Definition, Order and Degree of DE, Formation of DE. Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types

Unit - II **Application of DE:** **(08 Hrs)**

Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, One–Dimensional Conduction of Heat.

Unit - III **Fourier Series: Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series,Harmonic Analysis.** **(08 Hrs)**

Integral Calculus: Differentiation Under the Integral Sign, Error functions.

Unit - IV **Integral Calculus: Reduction formulae, Beta and Gamma functions** **(08 Hrs)**

Curve Tracing: Tracing of Curves, Cartesian, Polar. Rectification of Curves

Unit - V **Solid Geometry:** **(08 Hrs)**

Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder

Unit - VI **Multiple Integrals and their Applications:** **(08 Hrs)**

Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values.

Text Books:

1. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill),Edition ,2008.
2. Applied Mathematics (Volumes I and II) by P. N. Wartikar& J. N. Wartikar (Pune Vidyarthi GrihaPrakashan, Pune), 7th Edition, 1988, Reprint 2010.

Reference Books:

1. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education), 2nd ,Edition, 2002.
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition, 1999,Reprint 2010.
3. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.) , 6th Edition,1995
4. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi),42th Edition ,2012.

Syllabus for

Unit Test-I - UNIT – I, II, III

Unit Test-II - UNIT- IV,V,VI

Project Based learning topics for Integral Calculus:

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. Formation of differential equation
2. Exact differential Equation
3. Linear differential equation
4. Newton's law of cooling
5. Newton's second law of motion
6. Fourier's law
7. Kirchhoff's voltage law
8. Fourier series
9. Harmonic analysis
10. Gamma and beta function
11. Curve tracing
12. Locating position in three dimensional space
13. Multiple integrals applications
14. Error function
15. Differentiation under integral sign

Course: Applied Chemistry

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

Course Pre-requisites:

The students should have knowledge of

1 Corrosion, water and wastewater
2 air pollution and air polluting parameters
3 properties of cement, fuel cell, solar cell and alloys

Course Objective:

The student should be able to determine properties of water, cement and metal.

Course Outcomes: The student will be able to

1 Apply their knowledge for protection of different metals from corrosion.
2 Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
3 Identify the sources of air pollution and its implications on the environment.
4 To learn fundamentals of energy storage systems such as battery, solar cell
5 Outline the importance of testing of cement and its properties and applications.
6 To understand and analyze the necessity of making an alloy and its applications in various industries.

Course Content:

Unit - I Corrosion And Corrosion Protective Treatments: (06-Hrs)

Introduction, Definition, Types of corrosion, Mechanism of wet corrosion, Protection of Corrosion like, Metallic coatings, Electroplating, Methods of cleaning articles before electrode position, Electroplating methods, Electro less plating, Some electro less plating's, Some other metallic, coatings, Chemical conversion coatings, Organic Coatings, Paints, Varnishes, Enamels, Special paints.

Unit - II **Water And Waste Water Chemistry** **(06-Hrs)**

Introduction, Hardness of water, characteristics imparted by impurities, Analysis of contaminants, Treatment of Water by Zeolite, L-S process, Boiler feed water, Wastewater treatment. Green Chemistry: Definition, Twelve principles of Green Chemistry.

Unit - III **Air Pollution And its Analysis :** **(06-Hrs)**

Pollutants and their sources, pollution by SO2, CO2, CO, NOx, H2S and other foul-smelling gases. Methods of estimation of CO, NOx, SOx and control procedures. Green House effect and Global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and Halogens, removal of sulphur from coal. Control of particulates. Acid Rain, Green house effects, Depletion of Ozone

Unit - IV **Industrial Practice: Energy Storage Device :** **(06-Hrs)**

Solar cell, Fuel cells, Construction and Working of - Acid and Alkaline Storage Battery, Dry Cell, Ni-Cd Batteries, Ni-Mn Batteries, Li-Ion Batteries, Lead – Acid Batteries.

Unit - V **Cement : Definition, Classification and properties -** **(06-Hrs)**

Natural, Pozzolana & Port land Chemical constituent of Portland cement. Manufacture of Portland cement by wet process. Manufacture of Portland cement by dry process (using flow sheet diagram)Setting& Hardening of Portland cement with chemical reaction. Heat of hydration of cement. Properties and applications of Portland cement, Nano cement Chemical Reactions of Portland Cement, Cement/Water Reaction, Carbonation Reactions, Hydration Reaction Mechanism, Hydration Reaction on Aluminates, Fly ash reaction.

Unit - VI Alloys : (06-Hrs)

Introduction, Necessity (Purpose) of making alloys, Classification of alloys. Preparation of alloys – Fusion method, Electro deposition method, Composition, Properties & Application of following -(i) Brass (ii) Bronze (iii) Duralumin (iv) Nichrome (v) Steel – Mild, Medium & High.

Term Work: (Experiments)

1 Determination of dissolved oxygen in water.
2 Determination of hardness of a given water sample by using EDTA
3 Measurement of chloride, sulphate and salinity of water samples by Simple titration method. (AgNO3 and potassium chromate)
4 Determination of Ca from cement
5 To determine the strength of given acid using pH titrations.
6 Determination of Biochemical Oxygen Demand (BOD)
7 Study of corrosion of metals in medium of different pH.
8 To learn the specific charge/discharge characteristics of a Lithium- ion (Li- ion) battery through experimental testing of a remote triggered Li- ion Battery.
9 To Prepare Phenol formaldehyde/Urea formaldehyde resin.
10 To study set up of Daniel Cell
11 Determination of Biological Oxygen Demand (BOD)
12 To determine pH of soil
13 To determine Acidity of soil
14 To Study Lead – Acid Battery
15 Preparation of borax/ boric acid.

Assignments:

Six assignments to be given by the subject teacher (Theory)-one from each unit

Reference Books:

1. A Text Book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Co, 2004

2. Engineering Chemistry (16th Edition) Jain& Jain, Dhanpat Rai Publishing Company, 2013.
3. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992.
4. Bhal&Tuli, Text book of Physical Chemistry (1995), S. Chand & Company, New Delhi.
5. O. G. Palanna , Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
6. S. S. Dara, A textbook of Engineering Chemistry, McGraw-Hill Publication, New Delhi.
7. Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi.
8. Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015.
9. WILEY, Engineering Chemistry, Wiley India, New Delhi 2014.

Syllabus for Unit Test:

Unit Test -1 :UNIT – I to III

Unit Test -2 :UNIT – IV to VI

Topics for project based Learning for Applied Chemistry

1. Powder Coating methods used for prevention of metals from corrosion
2. Metallic Coating methods used for prevention of metals from corrosion
3. Analysis of various water contaminants
4. Treatment of water by Zeolite method.
5. To find various sources of air pollutants and its analysis.
6. Methods of estimation of CO, NOx
7. Construction and Working of - Acid and Alkaline Storage Battery
8. Construction and Working of Dry Cell, Ni-Cd Batteries
9. Manufacturing of Portland Cement.
10. To study the properties and applications of Portland cement.
11. Preparation of alloys – Fusion method, Electro deposition method.
12. To study Composition, Properties & Application of (i) Brass (ii) Bronze (iii)Duralumin
13. To study manufacturing of mild steel.
14. To analyze waste water .
15. To determine hardness of water and its ill effects.

Course: Statics and Dynamics

TEACHING SCHEME:	EXAMINATION SCHEME:	Total 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 Physics-Forces, Newton's law of motion, Concept of physical quantities, their units and conversion of units, Scalar and Vector

2 Mathematics-Algebra, Geometry, Concept of differentiation and integration

Course Objective:

The student should be able to determine effect of forces on rigid objects in static and dynamic state.

Course Outcomes:

The student will be able to

1 calculate resultant and apply conditions of equilibrium.

2 calculate friction force and its effect.

3 analyze the truss

4 calculate centroid and moment of inertia.

5 evaluate kinematic effect of forces

6 evaluate kinetic effect of forces

Course Content:

Unit - I Resultant and Equilibrium (08Hrs)

Types and Resolution of forces, Moment and Couple, Free Body Diagram, Types of Supports, Classification and Resultant of a force system in a Plane - Analytical and Graphical approach.

Equilibrant, Conditions of Equilibrium, Equilibrium of a force system in a Plane, Force and Couple system about a point.

Unit - II Friction (08 Hrs)

Coefficient of Static Friction, Impending motion of Blocks, Ladders and Belts.

Unit - III Analysis of Truss (08 Hrs)

Analysis of Perfect Trusses - Method of Joint, Method of Section and Graphical Method.

Unit - IV Centroid and Moment of Inertia (08 Hrs)

Centroid of line and plane areas, Moment of Inertia of plane areas, parallel and perpendicular axis theorem, radius of gyration, least moment of inertia.

Unit - V Kinematics of a Particle (08 Hrs)

Cartesian components, Normal and Tangential components of motion, Relative motion, Dependent motion, Motion of a Projectile,

Unit - VI Kinetics of a Particle (08 Hrs)

D'Alemberts Principle, Work-Energy Principle and Impulse-Momentum Principle, Coefficient of Restitution, Direct Central Impact.

Assignments:

1) Explain different types of forces and types of supports.
2) Calculate resultant of given force system
3) Calculate support reactions of the beam
4) What is equilibrium? What are conditions of equilibrium?
5) Calculate friction force for Blocks and Ladders.
6) Calculate tension on sides of Belts.
7) Calculate forces in members of truss.
8) Calculate centroid of given area.
9) Calculate moment of inertia of given area.
10) Calculate relative velocity of bodies.
11) Calculate motion and path of projectile.

12) Apply D'Alemberts Principle to solve given problem.
13) Apply Work-Energy Principle to solve given problem.
14) Apply Impulse-Momentum Principle to solve given problem.
15) Calculate velocity of bodies after impact.

Term Work:

The term-work shall consist of -

Part-A: Minimum Five experiments from list below.

1) Study of equilibrium of concurrent force system in a plane
2) Determination of reactions of Simple and Compound beam.
3) Determination of coefficient of friction for Flat Belt.
4) Determination of coefficient of friction for Rope.
5) Determination of Centroid of line or plane elements.
6) Study of Curvilinear motion.
7) Determination of Coefficient of Restitution.

Part-B: Minimum Five graphical solutions of the problems on different concepts in course content.

Reference Books:

1) Hibbeler R.C., "Engineering Mechanics (Statics and Dynamics)", McMillan Publication
2) Beer F.P. and Johnston E.R., "Vector Mechanics for Engineers-Vol.-I and Vol.-II (Statics and Dynamics)", Tata McGraw Hill Publication.
3) Bhavikatti S.S. and Rajashekarappa "Engineering Mechanics", K.G., New Age International (P) Ltd.
4) Shames I.H., "Engineering Mechanics (Statics and Dynamics)", Prentice Hall of India (P) Ltd.
5) Singer F.L., "Engineering Mechanics (Statics and Dynamics)", Harper and Row Publication
6) Meriam J.L. and Kraige L.G., "Engineering Mechanics (Statics and Dynamics)", John Wiley and Sons Publication

7) Timoshenko S.P. and Young D.H., "Engineering Mechanics (Statics and Dynamics)", McGraw Hill Publication
8) Tayal A.K., "Engineering Mechanics (Statics and Dynamics)", Umesh Publication
9) Mokashi V.S., "Engineering Mechanics-I and II (Statics and Dynamics)", Tata McGraw Hill Publication

Syllabus for Unit Test:

Unit Test -1 :UNIT – I to III

Unit Test -2 :UNIT – IV to VI

Topics for Project based Learning for Statics and Dynamics

1. Prepare model for various types of beams.
2. Prepare model for various types supports.
3. Prepare chart for various types of force system with suitable real-life examples.
4. Collect the various situations where varignon's theorem is used.
5. Prepare model or chart for equilibrium system of forces of various engineering applications.
6. Prepare chart for different types for trusses with showing various members.
7. Prepare prototype model of any one type of truss.
8. Calculate the forces in members of truss by using analytical method and check it graphically (At least three problems for different types of trusses)
9. Prepare chart of method of joint and method section for analysis of truss with stepwise procedure.
10. Prepare prototype models of the basic geometrical figures and locate the centroid of them.
11. Prepare prototype models of the I and T section and locate the centroid of them.
12. Prepare chart for parallel axis and perpendicular axis theorem with suitable example.
13. Prepare chart regarding the types of friction in various field conditions.
14. Prepare chart for application of friction.
15. Prepare chart for derivation of tangential and normal acceleration.

16. Prepare chart related to projectile motion with suitable example.
17. Development of excel sheet for projectile motion (at least three problems).
18. Development of excel sheet for work energy principle (at least three problems).
19. Prepare chart for work energy and Impulse momentum principle with suitable example.
20. Development of excel sheet for calculation of coefficient of restitution (at least three problems)

Basic Land Surveying

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED: 05
Theory: 04Hours / Week	End Semester Examination: 60 Marks	Theory: 04 Credits
Practical: 02Hours / Week	Internal Assessment: 40 Marks	
	Termwork & Practical:: 75 Marks	TW & PR: 01 Credits

Course Pre-requisites:

The Students should have knowledge of

1. Basic Mathematics and geometry

Course Objectives:

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

Course Outcomes:

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

1. Use instruments for linear measurements and prismatic compass for angular measurements.
2. Use instruments for levelling and compute reduced levels of ground points
3. Use Vernier theodolite for angular measurements and for other applications.
4. Use of Tacheometer for computation of distances and reduced levels. Use plane table and its accessories for surveying.
5. Set out simple circular curves by various methods.
6. Conduct surveys for various construction projects and explainuse of modern instruments.

UNIT - I Linear measurements and Compass survey (8Hours)

Principle, objectives and classification of Surveying. Linear measurements, methods, types of tapes, ranging, field work and plotting. Principle and working

of EDM. Compass Survey: types of meridians and bearings, construction and use of prismatic compass, local attraction and its correction, dip and declination.

UNIT - II Vertical measurements (8Hours)

Introduction, types of levels, principle axes of levels ,auto level and its working, temporary and permanent adjustments of auto-level,types of levelling staves, computation of reduced levels, profile levelling and cross sectioning. Contouring – direct and indirect methods, uses of contour maps. Introduction to trigonometrical levelling.

UNIT - III Theodolite Survey (8Hours)

Study and use of Vernier 20" theodolite, principle axes and temporary adjustments, measurements of horizontal angles by repetition and reiteration method, measurement of vertical angles and other uses, theodolite traversing: computation of consecutive and independent coordinates, adjustment of closed traverse by transit and Bowditch rule, simple cases of omitted measurements.

UNIT - IV Tacheometry and Plane Table Survey (8Hours)

Principle of stadia tacheometry, fixed hair method with vertical staff to determine horizontal distances and elevations of points. Plane table survey, equipment's their uses, methods of plane table survey- radiation, intersection, traversing and resection, errors and precision pf plane table survey.

UNIT - V Curves (8Hours)

Necessity of providing curves, simple circular curves, elements, setting out circular curves by radial and perpendicular offsets, offsets from long chord and offsets from chords produced. Angular method of deflection angles. Transition curves, necessity and types.

UNIT - VI Construction Survey and modern equipment's (8Hours)

Setting out buildings, survey for roads and tunnels, survey for drainage line, location of bridge piers. Introduction to Total station and its uses, use of digital planimeter for area measurement, study and use of toposheets.

Assignments:

1 Computation of corrected bearings of the traverse by different methods.
2 Solving problems on calculation of reduced levels by different methods.
3 Preparing contour map of the area from the given spot levels.
4 Solving problems on trigonometrical leveling.
5 Computations of independent coordinates of a closed traverse.
6 Solving problems on omitted measurements.
7 Calculation of reduced level and distance of a point by tacheometry.
8 Write details of survey for drainage line with proper sketches.

Term Work:

The term work shall consist of Field book and drawing containing record of (any 12) exercises and project listed below.

1 Linear measurements with tape and accessories.
2 Study and use of Prismatic compass.
3 Study and use of auto level and double check leveling
4 Compound leveling and fly leveling, calculation by rise and fall method.
5 Study and use of 20" Vernier Theodolite.
6 Measurement of horizontal angle of triangle by repetition method and applying check.
7 Measurement of vertical angle by transit Theodolite
8 Trigonometrical levelling by transit Theodolite.
9 Project 1 Road project of minimum length of 250 M including fixing of alignment, profile leveling and cross sectioning.(Two full imperial drawing)
10 Project 2 Theodolite traverse survey of closed traverse for minimum 0.5 hectares area including building roads etc. (One full imperial drawing)

11 Computation of horizontal distance and elevation of points by tachometry for horizontal and inclined sights.
12 Introduction and study of outfit of plane table and method of radiation.
13 Intersection method of plane table survey.
14 Closed plane table traverse survey around a small four-sided building.
15 Setting out simple circular curve by Rankin's method of deflection angle

Text Books

1 Surveying and Levelling Vol I and. II-T.P. Kanetkar and S.V. Kulkarni.
2 Surveying Vol. I & II - Dr. B.C. Punmia, Ashok K. Jain, Arun K. Jain.
3 Surveying for Engineers- John Uren & Bill Price- Palgrave Macmillan
4 Plane Surveying- A.M.ChandraNew age International Publishers
5 Surveying and Levelling- N. N. Basak, Tata Mc-Graw hill
6 Surveying Vol. I & II - Dr. K. R. Arora.

Reference Books:

1 Surveying: Theory and practice-James M. Anderson, Edward M. Mikhail
2 Surveying theory and practices-Devise R. E., Foot F.S.
3 Plane and Geodetic Surveying for Engineers. Vol. I -David clark.
4 Principles of Surveying. Vol. I - J.G.Olliver, J.Clendinning
5 Surveying Vol. I & II -S.K.Duggal, Tata Mc-Graw Hill.
6 Surveying and Levelling - Subramanian, oxford University Press.

Syllabus for :

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

Project List :

Unit I Linear measurements and Compass survey

1 Collect Information of Linear measurement techniques/ instruments from old age till 21st century, write report along with photos

2	Conduct closed traverse by prismatic compass and do the necessary calculations
Unit II	**Vertical measurements**
3	Prepare counter sheet by using Excel
4	Collect Information of Vertical measurement techniques/ instruments from old age till 21st century, write report along with photos
5	Vist to laboratory and collect information of levelling instrument and make ppt.
Unit III	**Theodolite Survey**
6	Make a PPT on Problem Solved by Bowditch Rule and present it in class
7	Make a PPT on Problem Solved by transit Rule and present it in class
8	Leaflet on uses of Theodolite
Unit IV	**Tacheometry and Plane Table Survey**
9	Write a report on- " Is Tacheometry and Plane table are required in today's digital world?"
10	PPT on working of plane table
11	Make vedio – of your own demonstrating parts and working of Tacheometry, share it with your classmate and take feed back
12	Digital booklet on numerical of Tacheometry share it with your classmate and take feed back
Unit V	**Curves**
13	Take Photograph of Curves of road you usually use and make a poster and display it on Notice Board.
14	Digital booklet on numerical of Rankine's method of Curves share it with your classmate and take feed back
15	Digital booklet on numerical of offset from long cord method of Curves share it with your classmate and take feed back

Unit VI	**Construction Survey and modern equipment's**
16	Collect information of latest surveying instrument : its cost, salient features and image and prepare Chart and display it on notice board.
17	Prepare Digital Chart on Importance of Basic Land Surveying in Civil Engineering share it and collect feed back
18	Present your idea of modification of any survey instrument in front of class.
19	Collect information on various software available for surveying
20	Prepare leaflet on Surveying for various projects.

Course: Construction Design & Drawing

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED: 04
Theory: 3 Hours / Week	End Semester Examination: 60 Marks	
	Internal Assessment: 40 Marks	Theory: 03 Credits
Practical: 2 Hours / Week	Term Work and Oral : 50 Marks	Term Work and Oral : 1 Credits

Course Pre-requisites:

The students should have knowledge of

1 Building Construction, Building materials, Knowledge of Engineering Graphics

Course Objectives:

To make the student illustrate the process of building planning and building byelaws

Course Outcomes:

The student will be able to

1 apply various Principals of planning and building byelaws.
2 apply design considerations for climate, ventilation, Noise & Acoustics in building planning.
3 apply design considerations for various building services & fire protection in building planning.
4 apply design considerations for plumbing services in building planning.
5 Understand the concept of .development plan
6 define the legal aspects of plan sanctioning.

Course Content:

UNIT - I Buildings Planning and Regulations (06 Hours)

Principles of planning for building, Integrated approach in Built Environment. Building Rules Regulations and Byelaws necessity, (National Building Code), plot size, open space around the building. FSI, Building line, control line. Height, room size, Built up area, floor area, carpet area. Rules of lighting ventilation, Drainage and Sanitation; Principles of Architectural design – form, function, utility, aesthetics.

UNIT - II Types of Buildings (06 Hours)

(a)Types of Residential Building units – Bungalows, Twin bungalows, Row houses, Apartments; Requirements of Public buildings - Educational buildings, buildings for health care, industrial buildings and commercial buildings; Types of drawings - Submission drawings, working drawings and Architectural drawings, Perspective drawings.

(b) Concept of ECO building, Green buildings, Intelligent building, Low Cost Housing, Planning considerations in High rise buildings.

UNIT - III Climate, Ventilation and Acoustics (06 Hours)

Elements of climate, thermal design Principles, Heat exchange of building, Thermal insulation of roof and wall.

Function of ventilation, stack effect wind effect, Mechanical ventilation, Air conditioning systems.

Effect of noise, Noise control sound insulation, Acoustics reverberation Sabine's formula, acoustical defects, conditions of good acoustics.

UNIT - IV Building Services (06 Hours)

Constructional requirements for different building services like Electrical, Telecommunication services, Circulation-Lift Types and Capacity, escalators, Entertainment services.

Fire Protection – Fire safety, fire load, grading of occupancies by fire load, fire escape elements.

Plumbing services, fixtures and fastenings, Layout of water supply & drainage system, Rate of water supply, storage and distribution arrangement, Plumbing systems.

UNIT - V Necessity and evolution of town planning in India. (06 Hours)

Development plan and its importance, Various surveys for development plan Objectives and Contents of DP, Land use zoning, Concept of regional plan.

UNIT - VI Legal Aspects of Plan Sanctioning (06 Hours)

Role of Plan Sanctioning Authority for layout, co-op Housing societies and apartments. Ownership of land, plot, 7/12 abstract, meanings of different terms of 7/12 abstract (Khasra), 6-D form, list of documents to be submitted along with building Plan for sanction from the authority. TDR, certificate of commencement and completion, various no objection certificates to be produced, format of permissions from pollution control board, MSEB, Water Supply and Drainage Department, State or National Highway Department.

Assignments:

Students should perform theoretical / experimental assignment/s from the list below

1 Assignment on Building Bye laws for residential buildings
2 Requirements of Green and intelligent buildings
3 Describe principles of Thermal design of buildings.
4 Prepare a layout for water supply and drainage of residential building.
5 Assignment on Development plan of a city
6 State and describe various legal documents for building construction.

Term Work:

Preparation of working drawings of any one of the buildings listed below:

a) Residential Building
b) Commercial Building
c) Educational Building
d) Industrial Building
e) Recreational Building
f) Health Club

Sheets to be drawn

1) Plan/Typical floor plan to a suitable scale.
2) Elevation and section to a suitable scale.
3) Site plan showing water supply and Drainage
4) Foundation Plan to a suitable scale.

Text Books:

1. S.P. Bindra S.P. Arora, "Building Construction", Laxmi Publication
2. M. L. Shah, C. M. Kale, S. Y. Patki, "Building Drawing with integrated approach to Built Environment", Tata McGraw Hill Publishers
3. Rangwala, "Town Planning" , Charaotar Publications

Reference Books:

1. IS provisions "National Building Code"
2. "Development Control Rules" of local plan sanctioning authority
3. Calendar, "Time Saver Standards for Architectural Design", Tata McGraw Hill Publishers
4. Merit, "Building Design and Construction", Tata McGraw Hill Publishers

Syllabus for

Unit Test-I UNIT – I, II, III

Unit Test-II UNIT- IV,V,VI

Project Based Learning

1 Study of National Building code of India to find Building Bye laws for planning residential buildings.

2. With the help of 3 different case studies of residential buildings study the application of Principles of building planning.

3 Preparing a measured drawing of a two bed room residential building (Plan, Elevation and section)

4 Take case study of green building and study provisions with reference to energy saving, solid waste management, recycling of water , use of green building materials.

5 With the help of site visit determine planning requirements for health care buildings and prepare a report.

6. With the help of site visit determine planning requirements for commercial buildings and prepare a report.

7 Study the architectural and working drawings for a building construction project and prepare a report.

8 With the help of site visit prepare a plumbing layout of a residential building and study various fixtures for plumbing.

9 Study of fire safety arrangements for high rise buildings and prepare a report.

10 Study the process of preparing development plan of a city and prepare a report.

11 With the help of case study prepare a report on zoning in Development plan.

12 With the help of site visit determine planning requirements for recreational buildings and prepare a report.

13. Take a case study of intelligent building and study various provisions and prepare a report.

14 Study the foundation plan of a residential building and prepare a report on lineout of a building.

15 Study the electrical layout plan of a building construction project and prepare a report.

16. Study of various legal documents such as 7/12 extract, TDR certificate, completion certificate.

17. With the help of site visit determine planning requirements for primary school building and prepare a report.

18. Study development control rues of the local authority and prepare a report.

19 With the help of site visit determine planning requirements for high rise building and prepare a report.

20 Study of Landscape details in a residential complex and prepare a report.

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

Course: Civil Engineering Software – I (AutoCAD)

TEACHING SCHEME: **EXAMINATION SCHEME:** **CREDITS ALLOTTED: 01**

Practical: 02 Hours / Week Term Work & Practical : 50 Marks TW & PR :01

Course Pre-requisites:

The students should have knowledge of

1 Knowledge of basic building aspects

2 Knowledge of various building components.

3 Knowledge of various building symbols

Course Objectives:

To make student capable of drawing any kind of Engineering drawing using AutoCAD.

Course Outcomes:

The student will be able to

1 draw various Engineering drawing using AutoCAD.

2 draw various elements of a building.

3 draw various elevation and sections of the building.

4 Draw and explain various modelling concepts of building construction and building drawing by using AutoCAD.

Course Content:

UNIT - I Introduction to AutoCAD and Command:

Introduction to AutoCAD, Basic AutoCAD commands- Line, Circle, Polyline, Rectangle, Polygon, Array, Trim, Offset, Fillet, Champers, Units, Limits, Move, Copy, Paste, Drawing space, Layout, Model.

UNIT - II Simple Plan Drawing:

Small bungalow plan scaled print out on A3 sheet, 1 BHK and 2 BHK Flats and bungalow plans, Elevation and Section.

UNIT - III 3D Drawing:

1 BHK Bungalow plans, 3D Truss, 3D Industrial shed, Steel drawing for bungalow.

Term Work:

The term-work shall consist of:

1) AutoCAD Drawing of small objects
2) AutoCAD Drawing of plan, elevation and section of small building.
3) AutoCAD 3D view of small building.

Text Books:

" Mastering AutoCAD 2016 and AutoCAD LT 2016 by Goerge Omura"

" Mastering AutoCAD 2017 and AutoCAD LT 2017 by Goerge Omura"

" Mastering AutoCAD 2018 and AutoCAD LT 2018 by Goerge Omura"

"AutoCAD 2018 Instructor perfect paperback by james A. Leach"

"Beginning AutoCAD Exercise workbook 2018 by Cheryl R. Shrock"

Reference Books:

"AutoCad : 2D Reference guide : 1 Paperback=1 january 2010 by C. S. Changeriya"

"AutoCAD 14 (The Complete Reference) Paperback – Import, 1 December 1998 by David S. Cohn"

Course: Object-Oriented Programming (Using C++)

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS:
Practical: 2 Hours / Week	Term Work: 25 Marks	Term Work: 1

Course Pre-requisites:

1 The students should have basic Knowledge of "C" programming language.

Course Objective:

Students will be able to do basic program in C++

Course Outcomes:

The student will be able to

1 Explain different Concepts of OOP, Characteristics of OOP.

2 Demonstrate the use of Data type , Keywords ,Tokens and Control Structures to Solve given Problem.

3 Demonstrate the use of functions to solve real world problem.

4 Compare different types of inheritance to solve given problem.

5 Explain different Types of Constructor and Destructor.

6 Develop OOP applications using file Handling.

Course Content:

Unit -I Introduction to Object Oriented Programming:

Introduction to Object Oriented Programming, Basic Concept of OOP,Characteristics of OOP, Need for OOP, Benefits of OOP, Object Oriented Languages, Applications of OOP.

Unit -II **Beginning with C++:**

Overview of C++, Sample C++ Program, C++ statements, Structure of C++ program, Creating source file , compiling and Linking C verses C++, C++ Characteristics, Structure of C++ program, Tokens, Keywords , Identifiers and Constants, Data Types ,Declaration of variables, Dynamic initialization of variables, Control Structures.

Unit -III **Functions in C++:**

Function Prototyping, Call by Reference, Inline functions, Default arguments, Function Overloading , Friend and Virtual Functions .

Classes and Objects:

Class specification , Class Objects , Scope resolution operator, Access specifies Public, Private, Protected, Defining member Functions, Nesting of Member Functions, Private Member Functions, Static Data Members , Static Member Functions,

Unit - IV **Inheritance and Polymorphism:**

Defining Derived Classes, Types of Inheritance, Virtual Base Class, Abstract class.

Polymorphism:

Base class, Virtual Functions, Pure Virtual Functions, Calling a virtual function through a base class reference, Early and Late Binding.

Unit - V **Constructors and Destructors:**

Constructors, Parameterized constructors, Default Constructors, Copy constructor, Dynamic Initialization of Objects, Destructors.

Unit - VI **Managing Console I/O operations:**

C++ Stream Classes, Unformatted I/O Operations, Working with Files, Opening and Closing a file, Formatted I/O.

Term Work:

1. Study of different Object Oriented Programming Concept ,Application and benefits of OOP.
2. Write a C++ program to find whether given number is perfect number or not.
3. Write a C++ Program to find Fibonacci Series.
4. Write a C++ Program to find Area of Circle and Triangle Using concept of Function Overloading.
5. Write a C++ program for simple Calculator using Class and Object Concept.
6. Write a C++ Program for Employee Management System Using Single inheritance, Multiple inheritance and Multilevel inheritance.
7. Write a C++ Program to implement Concept of Constructor and Destructor.
8. Write a C++ Program for Storing Student Information with the help of File reading and Writing Operations.

Reference Books:

1) Herbert Schildt, "The Complete Reference C++", 4thEdition, Mc Graw Hill, 2003.
2) Stanley. B. Lippmann, Josee Lajoie, Barbara. E. Moo, "C++ Primer", 5th Edition, Pearson Education, 2013.
3) Scott Meyers:"Effective C++",Third Edition, Addison-Wesley, 2005.
4) E. Balaguruswamy, "Object Oriented Programming using C++", 4th Edition, Mc Graw Hill, 2010

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 (%)**
$9.50 \leq$ CGPA ≤ 10.00	O	Outstanding	$80 \leq$ Marks ≤ 100
$9.00 \leq$ CGPA ≤ 9.49	A+	Excellent	$70 \leq$ Marks <80
$8.00 \leq$ CGPA ≤ 8.99	A	Very Good	$60 \leq$ Marks < 70
$7.00 \leq$ CGPA ≤ 7.99	B+	Good	$55 \leq$ Marks < 60
$6.00 \leq$ CGPA ≤ 6.99	B	Average	$50 \leq$ Marks < 55
$5.00 \leq$ CGPA ≤ 5.99	C	Satisfactory	$40 \leq$ Marks < 50
CGPA below 5.00	F	Fail	Marks Below 40