Zeal Education Society's

ZEAL COLLEGE OF ENGINEERING & RESEARCH, PUNE – 41

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

*NAAC Accredited with **A+** Grade / ISO 21001:2018*

DEPARTMENT OF CIVIL ENGINEERING

Curriculum Structure and Syllabus of

F.Y. B. Tech. – Civil Engineering

(With effect from - Academic Year 2026 - 27)

(2026 Pattern)

VISION OF THE INSTITUTE

To be a premier institute in technical education by imparting academic excellence, research, social and entrepreneurial attitude.

MISSION OF THE INSTITUTE

- To achieve academic excellence through innovative teaching and learning process.
- To imbibe the research culture for addressing industry and societal needs.
- To inculcate social attitude through community engagement initiatives.
- To provide conducive environment for building the entrepreneurial skills.

DEPARTMENT OF CIVIL ENGINEERING

VISION:

To contribute to the field of Civil Engineering by focusing state of the art technical knowledge, promoting research, nurturing social responsibility and imparting entrepreneurial attitude.

MISSION:

M1: To strengthen academics with holistic teaching learning practices.
M2: To inculcate a research approach pertaining to the civil engineering domain.
M3: To foster students for the development of entrepreneurial skills.
M4: To nurture the sense of ethics, morality and social responsibility.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Graduates will be proficient in critical thinking and problem solving based on a broad range of civil engineering technical areas.
PEO2: Graduates will be good decision makers with a blend of ethical, global, regional and local concerns, effective communication and leadership.
PEO3: Graduates will be able to contribute to society by civic engagement.
PEO4: Graduates will attain the pursuit of professional development and ever learning.

PROGRAM OUTCOMES (POs):

PO1: **Engineering knowledge:** Apply the knowledge of mathematics, natural science, computing, and engineering fundamentals and an engineering specialisation to the solution of complex engineering problems.
PO2: **Problem analysis:** Identify, formulate, and analyze complex engineering problems, reaching substantiated conclusions with consideration for the holistic nature of the problem.
PO3: **Design /development of solutions:** Design creative solutions for complex engineering problems and design systems, components, or processes to meet identified needs — with consideration for public health and safety, and cultural, societal, and environmental factors. Sustainability is now intrinsic to design.
PO4: **Conduct investigations of complex problems:** Conduct investigations of complex engineering problems using research-based knowledge and research methods, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO5: **Engineering tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling — recognising their limitations — to solve complex engineering problems.

PO6: The engineer and the world: Analyse and evaluate societal and environmental aspects while solving complex engineering problems, considering their impact on sustainability with reference to economy, health, safety, legal frameworks, culture, and the environment.

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity, and inclusion; and adhere to relevant national and international laws

PO8: Individual and team work: Function effectively as an individual, and as a member or leader in diverse and multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and with society at large — comprehending and writing effective reports and design documentation, and making effective presentations — considering cultural, language, and learning differences.

PO10: Project management and finance: Apply knowledge and understanding of engineering management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects in multi-disciplinary environments.

PO11: Life-long learning: Recognise the need for, and have the preparation and ability for, independent and life-long learning, adaptability to new and emerging technologies, and critical thinking in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Graduates will be able to develop the professional skills for analysing and designing of structural, geotechnical, transportation, environmental, irrigation and hydraulic systems to cater societal and /or industrial needs.

PSO2: Graduates will be able to apply the knowledge pertaining to surveying, construction and/or management, town planning, estimation, valuation and soft computing tools to solve real time problems related to civil engineering.

DEPARTMENT OF CIVIL ENGINEERING

LIST OF ABBREVIATIONS

Abbreviation	Description
BSC	Basic Science Course
ESC	Engineering Science Course
PCC	Programme Core Course
PEC	Programme Elective Course
MDM	Multidisciplinary Minor
OE	Open Elective - Other than a particular program
VSEC	Vocational and Skill Enhancement Course
AEC	Ability Enhancement Course
ENTR	Entrepreneurship
EC	Economics
MC	Management Courses
IKS	Indian Knowledge System
VEC	Value Education Courses
RM	Research Methodology
CEP	Community Engagement Project
FP	Field Project
PROJ	Project
INT	Internship
OJT	On Job Training
CC	Co-curricular Courses
HSSM	Humanities Social Science and Management
ELC	Experiential Learning Course
B. Tech	Bachelor of Technology
L	Lecture
P	Practical
T	Tutorial
H	Hours
CR	Credits
CIE	Continuous Internal Evaluation
ETE	End Term Evaluation
TH	Theory
Tut	Tutorial
TW	Term Work
OR	Oral
PR	Practical

DEPARTMENT OF CIVIL ENGINEERING

First Year B. Tech. – Civil Engineering: Semester - I

Course Code	Course Type	Course Name	Teaching Scheme (hrs/Week)							Evaluation Scheme					
			L	P	T	H	CR			CIE	ETE	TW	PR	OR	Total
							TH	PR/Tut	Total						
26CEBS101	BSC	Engineering Mathematics I	3	-	-	3	3	-	3	40	60	-	-	-	100
26CEBS102	BSC	Engineering Physics	2		-	2	2		2	40	60	-	-		100
26CEBS102P	ESC	Engineering Physics Lab	-	2		2	-	1	1			-	-	25	25
26CEES101	ESC	Civil Engineering Science and Technology	3		-	3	3		3	40	60	-	-		100
26CEES101P	ESC	Civil Engineering Science and Technology Lab	-	2		2	-	1	1			-	-	50	50
26CEES102	ESC	Scientific Principles of Building Planning	3	-	-	3	3		3	40	60	-	-	-	100
26CEVS101	VSEC	Building Planning and Drawing Practices	-	4	-	4	-	2	2	-	-	50	50	-	100
26CECC101	CC	Professional Development - I	1	2	-	3	1	1	2	-	-	50	-	-	50
26CECC102	CC	Liberal Learning - I	-	2	-	2	-	1	1	-	-	25	-	-	25
26CEIK101	HSSM-IKS	Indian Knowledge System & Financial Literacy	2	-	-	2	2	-	2	-	-	50	-	-	50
Total			**14**	**12**	**-**	**26**	**14**	**8**	**20**	**160**	**240**	**175**	**50**	**75**	**700**

BoS Chairman

ZES's Zeal College of Engineering & Research PU/PN/Engg./285/2007 Narhe, Pune-41

Director
ZES's Zeal College of Engineering & Research
Narhe, Pune - 411041.

DEPARTMENT OF CIVIL ENGINEERING

First Year B. Tech. – Civil Engineering: Semester - I

*** Liberal Learning – I: Choose any one from the following:**

Sr. No.	Course Code	Module	Sr. No.	Course Code	Module
1.	26CECC102A	Guitar	6.	26CECC102F	Basketball
2.	26CECC102B	Singing	7.	26CECC102G	Cricket
3.	26CECC102C	Cinematography	8.	26CECC102H	Rifle and Pistol Shooting
4.	26CECC102D	Dance	9.	26CECC102I	Volleyball
5.	26CECC102E	Synthesizer	10.	26CECC102J	Football

BoS Chairman

ZES's Zeal College of Engineering & Research ★ Narhe, Pune-41 ★ PU/PN/Engg./285/2007

Director
ZES's Zeal College of Engineering & Research
Narhe, Pune - 411041.

DEPARTMENT OF CIVIL ENGINEERING

First Year B. Tech. – Civil Engineering: Semester - II

Course Code	Course Type	Course Name	Teaching Scheme (hrs/Week)							Evaluation Scheme					
			L	P	T	H	CR			CIE	ETE	TW	PR	OR	Total
							TH	PR/Tut	Total						
26CEBS203	BSC	Engineering Mathematics II	3	-	-	3	3	-	3	40	60	-	-	-	100
26CEBS204	BSC	Engineering Chemistry	2		-	2	2	1	3	40	60	-	-	-	100
26CEBS204P	BSC	Engineering Chemistry Lab	-	2	-	2	-	1	1	-	-	-	-	25	25
26CEES203	ESC	Engineering Mechanics	3		-	3	3	1	4	40	60	-	-	-	100
26CEES203P	ESC	Engineering Mechanics Lab	-	2	-	2	-	1	1	-	-	-	-	50	50
26CEES204	ESC	Engineering Science of Construction Materials	2	-	-	2	2	-	2	40	60	-	-	-	100
26CEPC201	PCC	Concrete Technology	3	-	-	3	3	-	3	40	60	-	-	-	100
26CEVS202	VSEC	Concrete Testing Practices	-	4	-	4	-	2	2	-	-	25	-	-	25
26CECC203	CC	Professional Development - II	1	2	-	3	1	1	2	-	-	25	-	-	25
26CECC204	CC	Liberal Learning - II	-	2	-	2	-	1	1	-	-	25	-	-	25
26CEAE201	HSSM - AEC	IT Proficiency	1	2	-	3	1	1	2	-	-	50	-	-	50
Total			**15**	**14**	**-**	**29**	**15**	**9**	**24**	**200**	**300**	**125**	**0**	**75**	**700**

BoS Chairman

ZES's Zeal College of Engineering & Research PU/PN/Engg./285/2007 Narhe, Pune-41

Director
ZES's Zeal College of Engineering & Research
Narhe, Pune - 411041.

DEPARTMENT OF CIVIL ENGINEERING

First Year B. Tech. – Civil Engineering: Semester - II

*** Liberal Learning – II: Choose any one from the following:**

Sr. No.	Course Code	Module	Sr. No.	Course Code	Module
1.	26CECC204A	Guitar	6.	26CECC204F	Basketball
2.	26CECC204B	Singing	7.	26CECC204G	Cricket
3.	26CECC204C	Cinematography	8.	26CECC204H	Rifle and Pistol Shooting
4.	26CECC204D	Dance	9.	26CECC204I	Volleyball
5.	26CECC204E	Synthesizer	10.	26CECC204J	Football

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DEPARTMENT OF CIVIL ENGINEERING

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1.	25CEBS101	Engineering Mathematics I	1
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3.	25CEBS102P	Engineering Physics Lab	6
4.	25CEES101	Civil Engineering Science and Technology	8
5.	25CEES101P	Civil Engineering Science and Technology Lab	12
6.	25CEES102	Scientific Principles of Building Planning	15
7.	25CEES102P	Building Planning and Drawing Practices	18
8.	25CEVS101	Professional Development - I	20
9.	25CECC101	Liberal Learning - I	22
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First Year B. Tech. - Civil Engineering : Semester – II			
11.	25CEBS203	Engineering Mathematics II	40
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14.	25CEES203	Engineering Mechanics	47
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16.	25CEES204	Engineering Science of Construction Materials	54
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18.	25CEVS202	Concrete Testing Practices	60
19.	25CECC203	Professional Development - II	62
20.	25CECC204	Liberal Learning - II	64
21.	25CEAE201	IT Proficiency	77

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS

SEMESTER - I

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)							**Semester:** I		
Course: Engineering Mathematics - I							**Code:** 26CEBS101		
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	-	-	03	40	60	-	-	-	100

Prerequisites:

Basic concept of Differentiation, Integration, Maxima and Minima, Matrices and Determinants.

Course Objectives:

1. To acquaint the students to rank of matrix, solution of simultaneous equations, Eigen values and Eigen vectors.
2. To acquire techniques of the expansion of functions about any point and to evaluate the indeterminate forms of limits.
3. To make students familiar with multivariable differentiation and its applications.

Course Outcomes: After completion of this course, students will be able to -

CO1	Use of matrix method for solving system of simultaneous linear equations.
CO2	Find Eigen values and Eigen vectors of the matrix.
CO3	Describe the power series expansion of a given function and evaluate limits.
CO4	Understand the basic concepts of partial derivatives**.**
CO5	Evaluate partial derivatives to estimate maxima and minima of function of multiple variables.
CO6	Determine the Fourier series representation and harmonic analysis for design.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**System of Linear Equations:** Rank of a matrix, System of linear equations, Linear dependence and independence of vectors, Linear and orthogonal transformations, Application to problems in engineering.	07
2.	**Eigen Values and Eigen Vectors, Diagonalization:** Eigen values and Eigen vectors, Cayley-Hamilton theorem, Diagonalization of a matrix, Reduction of quadratic forms to canonical form by linear and orthogonal transformations.	07
3.	**Differential Calculus:** Rolle's theorem, Mean value theorems, Taylor's series and Maclaurin's series, Expansion of functions using standard expansions, Indeterminate forms.	07
4.	**Partial Differentiation:** Partial derivatives of first and higher orders, Euler's theorem on homogeneous functions, Partial derivative of composite functions, Total derivative and Implicit differentiation	06
5.	**Applications of Partial Differentiation:** Jacobians and their applications, Errors and Approximations. Maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers.	06
6.	**Fourier Series:** Definition, Dirichlet's conditions, Full range Fourier series, Half range Fourier series, Harmonic analysis.	06
	TOTAL	**39**

DEPARTMENT OF CIVIL ENGINEERING

Text Books:

1. B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill
2. B. S. Grewal , "Higher Engineering Mathematics", Khanna Publication
3. Howard Anton & Chris Rorres , "Elementary Linear Algebra" , John Wiley & sons.
4. Seymour Lipschutz, Marc Lipson , "Schaum's outlines of Linear Algebra", 6th edition McGraw-Hill Education (India) Private Limited, New Delhi.

Reference Books:

1. Erwin Kreyszig , "Advanced Engineering Mathematics" , Wiley Eastern Ltd.
2. M. D. Greenberg , "Advanced Engineering Mathematics" , Pearson Education.
3. Peter V. O'Neil , "Advanced Engineering Mathematics" , Thomson Learning.
4. P. N. Wartikar and J. N. Wartikar , "Applied Mathematics (Vol. I & Vol. II)", Vidyarthi Griha Prakashan, Pune.
5. Ron Larson and David C. Falvo, "Elementary Linear Algebra" ,Houghton Mifflin Harcourt Publishing Company

E-Resources:

1. A NPTEL Course on "Engineering Mathematics-I" IIT Khargpur - https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5

2. Paathshala Pandit , "Rank of Matrix | Vector Space | Engineering Mathematics" - https://www.youtube.com/watch?v=jHU3yasfpKw&list=PLU4tRlorU5wWPpemhfdG0Yc4zNiICSMVO&index=1

3. Eigenvalues and Eigenvectors | Properties and Important Result | Matrices- https://www.youtube.com/watch?v=1wjXVdwzgX8

4. Taylor Series | Numericals | Maths 1 | B.Tech 1st year | Engineering | BSc - https://www.youtube.com/watch?v=0bHky1ocA1Y

5. Partial Differentiation Example And Solution | Multivariable Calculus - https://www.youtube.com/watch?v=eTp5wq-cSXY&list=PLU6SqdYcYsfLuIJdHwY92aGBg5-uRHBOb&index=1

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Engineering Physics								**Code:** 26CEBS102	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	-	-	02	40	60	-	-	-	100

Prerequisites:

Fundamentals of Physics, basic of interference, polarization, de-Broglie hypothesis, semiconductor and ultrasonic.

Course Objectives:

1. To make the students understand and study the basic principles of Physics.
2. To provide firm grounding to the students in the concept of physics to resolve many engineering and technological problems.
3. To impart the knowledge of the fundamentals of physics to the students through hands on experiments and extend it to relevant engineering applications.

Course Outcomes: After completion of this course, students will be able to -

CO1	Explain basics of interference and polarization connected to engineering applications.
CO2	Make use of Laser technology and Optical fiber in various disciplines.
CO3	Outline the fundamentals of Quantum Physics and relate it to engineering applications.
CO4	Apply basics of semiconductors for solving the engineering problems.
CO5	Extend the understanding of Ultrasonic and NDT in engineering.
CO6	Interpret the use of nanoparticles and superconductors in the field of engineering.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Wave Optics:** **Units and its conversion**-Length, Mass, Velocity, Acceleration Momentum, Time, Temperature, Wavelength, Energy, Current, Voltage, Power, Intensity, Amplitude, Frequency, Pressure, Resistance, compressibility, resistivity, conductivity, Mobility, Angle. **Interference-** Interference in thin film of uniform thickness and its conditions (Simple Numerical), Engineering Applications – Ant-Reflection coating (ARC). **Polarization**- Polarization and its types, Malus law and Brewster's law (Simple numerical), Double refraction, Huygens's theory of double refraction, Differentiate between positive & negative crystal, Engineering applications of polarization: Liquid Crystal Display (LCD).	05
2.	**Laser and Optical Fiber:** **Laser**- Basic Principles of laser, Elements of Laser, Characteristics of laser, He-Ne laser (Gas laser), Applications of laser – Medical, Industrial and Holography- Recording. **Optical fibers-** Propagation of light - Acceptance angle, Acceptance cone, Numerical aperture, Fractional Refractive Index Change (Simple numerical). Types of optical fibers, Advantages of optical fiber communication, Applications of optical fiber in Medical, Communication, Entertainment, Data Security.	05

3.	**Quantum Physics:** De-Broglie hypothesis of matter waves, de-Broglie wavelength for a particle accelerated by Kinetic Energy (K.E) and a charged particle accelerated by Potential difference (PD) "V", (Simple Numerical), Properties of matter waves, Heisenberg's uncertainty principle for wide wave packet and narrow wave packet (Simple Numerical), Tunneling Effect, Engineering applications - Scanning Tunneling Microscope (STM), Introduction to Quantum Computing.	04
4.	**Semiconductor Physics:** Classification of solids on the basis of band theory, Fermi level for metal and semiconductor, Position of Fermi level in extrinsic semiconductors (only diagram), Solar cell: principle, working, IV-characteristics, Efficiency and fill factor, Factor to improve efficiency of solar cell, Application, advantages and disadvantages of solar cell, Hall effect: derivation for Hall voltage and Hall coefficient (Simple numerical).	04
5.	**Ultrasonic and Non-destructive Testing:** **Ultrasonic**- Properties of ultrasonic waves, Piezoelectric effect and inverse of piezoelectric effect, Generation of ultrasonic waves by inverse piezoelectric effect (using transistor), Compressibility of liquid by using ultrasonic waves (Simple Numerical). **Non- Destructive Testing (**NDT): Definition and its objectives, Difference between destructive testing and non-destructive testing, Application of NDT as an Ultrasonic flaw detection technique (Simple numerical), Advantages of NDT.	04
6.	**Nanophysics and Superconductivity:** **Nanophysics-** Introduction of nanophysics, Properties of nanoparticles (Optical, Electrical, Mechanical), Applications of nanomaterials in Electronics, Automobile, Medical. **Superconductivity-** Definition of superconductivity on the basis of temperature dependence of resistivity, Properties of Superconductors, Meissner effect, Critical magnetic field (Simple Numerical), Type I and Type II Superconductors, Engineering applications of superconductivity in Superconducting Quantum Interface Device (SQUID) with its principle, working, general application of superconductors - Power Transmission, electronics, medical, principle of Maglev train.	04
	TOTAL	**26**

Text Books:

1. M. N. Avadhanulu and P.G. Kshirsagar, "Engineering Physics", S. Chand Publications.
2. S. O. Pillai, "Solid State Physics", New age International Publications.
3. J. J. Sakurai, "Modern Quantum Mechanics", Pearson Publication.
4. V K Mehta and Rohit Mehta, "Basic Electrical Engineering", S Chand Publications.
5. Robert L. Jaffe and Washington Tayler, "The Physics of Energy", Cambridge University Press".

Reference Books:

1. H. D. Young and R. A. Freedman, "University Physics", Pearson Publication.
2. Resnick and Halliday, "Principles of Physics", John Wiley and Sons.
3. Jenkins and White, "Optics", Tata McGraw Hill.
4. Noson S. Yanofsky and Mirco A. Mannucci, "Quantum computing for computer scientists", Cambridge University Press

DEPARTMENT OF CIVIL ENGINEERING

E-Resources:

1. NPTEL Course:
   a. NPTEL lecture based on interference of polarized light by IIT Roorkee https://youtu.be/e-4QK_JVsdU?si=gWIBt41dDgeABO8Y
   b. NPTEL lecture based on Introduction of Polarization by IIT Roorkee- https://youtu.be/fIVlzKB4bBQ?si=meWFP5matsopCABi
   c. NPTEL lecture based on Malus Law by IIT Roorkee https://youtu.be/iFG82I3nFA0?si=JCln6fJqGNw6ix5U
   d. NPTEL lecture based on Double Refraction by IIT Roorkee https://youtu.be/Pt5wvYyguq0?si=4mowxORZQXGXNxMW
   e. NPTEL lecture based on Semiconductor Physics by IIT Roorkee - https://youtu.be/q7VIITSysMs?si=62lAMoJ2tMHKRiDH
   f. NPTEL lecture based on Introduction to superconductivity https://youtu.be/hGPA1g8fKug?si=FdYfJju6bf6u2zRe
   g. NPTEL lecture based on Meissner Effect- https://youtu.be/EkNnxBakJMs?si=qRnSvPlD2NTe4r-

2. Feynman lecture series https://www.feynmanlectures.caltech.edu/

3. Concepts of Modern Physics, Arthur Beiser: - https://nitsri.ac.in/Department/PHYSICS/Beiser_Modern_Physics.pf

4. Lectures by Walter Lewin https://www.youtube.com/channel/UCiEHVhv0SBMpP75JbzJShqw

5. Quantum Mechanics Lecture Series by Prof. H.C.Verma https://www.youtube.com/watch?v=JFWuAQRZPjQ&list=PLWweJWdB_GuISnGkAafMpzzDBvTHg02At

6. Virtual Labs, Amrita University https://vlab.amrita.edu/?sub=1&brch=195

7. Virtual Labs, IIT Kanpur https://bop-iitk.vlabs.ac.in/exp/energy bandgap/simulation.html

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Engineering Physics Lab								**Code:** 26CEBS102P	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	-	25	-	25

Prerequisites:

Fundamentals of Physics, basic of interference, polarization, de-Broglie hypothesis, semiconductor and ultrasonic.

Course Objectives:

1. To provide hands-on experience in fundamental optical phenomena such as interference, diffraction, polarization, and double refraction.
2. To develop experimental skills in determining optical constants like wavelength, refractive index, radius of curvature, and numerical aperture.

Course Outcomes: After completion of this course, students will be able to -

CO1	Apply the principles of interference and diffraction to determine optical parameters such as wavelength, radius of curvature, and grating characteristics.
CO2	Demonstrate experimental skills in precise measurement, data analysis, error estimation, and scientific interpretation of results.

List of Experiments:

Perform any (08) experiment out of 12:

1. Experiment based on Newton's rings (determination of wavelength of monochromatic light, determine radius of curvature of Plano-convex lens).
2. Experiment based on polarization (To verify Law of Malus).
3. Determination of refractive index using Brewster's law.
4. Experiment based on Double Refraction (Determination of refractive indices / Identification of types of crystal).
5. Experiment based on Laser (Determination of thickness of wire / Number of lines on grating surface).
6. Determination of Planck's constant using available experimental setup.
7. To study IV characteristics of Solar Cell and determine parameters (fill factor and efficiency).
8. To determine Hall coefficient and charge carrier density.
9. Determination of velocity of ultrasonic waves and compressibility of given liquid by using Ultrasonic Interferometer.
10. An experiment based on optical fiber. (To determine the numerical aperture acceptance angel acceptance cone of optical fiber of laser diode.
11. Experiment based on semiconductor (To determine the temperature dependence characteristics of semiconductor).
12. To determine the unknown wavelength by using plane diffraction grating.

Reference Books:

1. H. D. Young and R. A. Freedman, "University Physics", Pearson Publication.
2. Resnick and Halliday, "Principles of Physics", John Wiley and Sons.
3. Jenkins and White, "Optics", Tata McGraw Hill.
4. Noson S. Yanofsky and Mirco A. Mannucci, "Quantum computing for computer scientists", Cambridge University Press

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering								**Semester: I**	
Course: Civil Engineering Science and Technology								**Code:** 26CEES101	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	-	-	03	40	60	-	-	-	100

Prerequisites:

Basic mathematics, Environmental studies

Course Objectives:

1. To acquaint the students with the broad scope of the different sub-branches of civil engineering.
2. To acquaint the students with basic principles of surveying and applications of surveying instruments.
3. To acquaint the students with the elements of buildings, as well as planning & construction methods of buildings.

Course Outcomes: After the completion of course, students will be able to

CO1	Explain the fundamental domains within civil engineering and emphasize the significance of an interdisciplinary approach.
CO2	Apply the concepts in field surveys and field measurements.
CO3	Employ leveling methods to overcome surveying difficulties and clarify contour characteristics.
CO4	Evaluate geological conditions to make appropriate decisions for the selection, investigation, and treatment of construction sites.
CO5	Categorize building elements according to their intended functional roles.
CO6	Describe the necessity for automation in construction and the function that civil engineering plays in the development of infrastructure.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to Civil Engineering:** **A) Basic Areas in Civil Engineering**: Surveying, Construction Engineering, Fluid Mechanics, Transportation Engineering, Project Management, construction management, Water Resource Engineering, Structural Engineering, Geotechnical and Foundation Engineering, Environmental Engineering, Quantity Surveying. Town Planning, Earthquake Engineering. Role of Civil engineer in infrastructural development **B) Units and unit Conversions:** Types of measurement systems, Units of quantities, decimal multiples and sub-multiples Unit Conversions – Numericals included, Lengths – mm to cm, m, km, feet, inch, mile, yard and vice versa, Area – mm^2 to cm^2, m^2, km^2, ft^2, in^2, guntha, acre, hectre, yard, brass and vice versa Volume - mm^3 to cm^3, m^3, km^3, ft^3, in^3, brass, mili-litre, litre, and vice versa, Mass – mg to gm, kg, quintal, ton, lb and vice versa Time – second to minute, hr, day, year and vice versa, Temperature – degree, Celsius, Fahrenheit, kelvin and vice versa Force – dyne to N, KN, kgf and vice versa Pressure – N/mm^2 to N/m^2, Pa and vice versa, Angle – Degree to minutes, seconds, radians and vice versa.	07

2.	**Surveying** Principles of surveying, Classification & types of surveys, scale and its types, maps and its types, Linear Measurement: Tape - types. Angular Measurements: Compass & its types, Meridian and its types, Bearing and its types, dip and declination, Calculation of included angles, local attraction &its correction.	07
3.	**Levelling** Objectives of levelling, Terms in levelling, Types of benchmarks, Levelling instruments, Temporary adjustments of level instruments, Types of levelling, Methods of reduction of levels.	07
4.	**Structural and Applied Engineering Geology** Outcrop, strike and dip, conformable and unconformable series, types of unconformity, overlap, faults and their types, folds and their types, joints with their geometric and genetic classification, inlier and outlier, and engineering significance of faults, folds and joints. Engineering Geology of Dams: strength, stability and water-tightness of foundation rocks, influence of geological conditions on selection and type of dam, geological considerations for dam and reservoir sites, preliminary geological investigations, common geological problems and their treatment. Tunnelling: preliminary geological investigations, geological considerations for tunnel alignment, geological difficulties during tunnelling, role of groundwater, suitability of common rock types for excavation and tunnelling, and basic tunnel support and treatment methods.	06
5.	**Components of a Building** A) Substructure: Definition and functions of Foundation, Types of foundation. B) Plinth: Definition, Purpose C) Superstructure: Definition, Column, Beam, Slab, Wall, Doors and Windows, Sills, Lintels and Weather sheds, Roofs, Stairs, Utility Fixtures D) Types of loads E) Types of Construction: Load Bearing, Framed, Composite.	06
6.	**Infrastructure development and automation in Civil Engineering** Types of infrastructure, Infrastructure development in India, smart city concept, Automation in civil engineering projects. Concept of Precast and prefab construction, Aluminium Formwork. Introduction to Building Information Modeling	06
	TOTAL	**39**

Text Books:

1. G K Hiraskar, "Basic Civil Engineering", Dhanpat Rai Publication, Edition 2004.
2. S.S. Bhavikatti, "Basic Civil Engineering", New Age publications, 2020.
3. Satheesh Gopi, "Basic Civil Engineering", Pearson, 2019.

Reference Books:

1. N.N. Basak, "Surveying", Tata Mc-Graw Hill Publications, Edition 2014.
2. Bindra and Arora, "Building Construction and Drawing", Dhanpat Rai Publications, Edition 2012.
3. Sushil Kumar, "Building Construction and Drawing", Standard Publications, Delhi, Edition 2010.
4. Kanetkar and Kulkarni, "Surveying and Levelling", PVG Publications, Edition 2014.
5. S.K. Garg, "Water Supply Engineering", Khanna Publishers, Delhi, 33rd Edition 2019.

6. Khanna, C.E. G Justo, A. Veersrsgavan, "Highway Engineering", Nem Chand and Bros Publication, Edition 2018.
7. S.C. Saxena, S.P. Arora, "Railway Engineering", Dhanpat Rai Publication, Edition 2015.
8. National Building Code –Bureau of Indian Standards 2016.

E-Resources:

1. NPTEL Video lecture on "What is Civil Engineering"
   https://youtu.be/CsKddkqgwVk?si=h3lx_RFzqACqk9Ko
2. NPTEL Video lecture on "Introduction to Environmental Engineering"
   https://youtu.be/0aXP5qnihns?si=x6K6ZobHo8x2k9ty
3. NPTEL Video lecture on "Interesting Environmental Projects"
   https://youtu.be/LRsla_wsCTs?si=2xuETqFKA1ZNsM3i
4. NPTEL Video lecture on "Hydraulics and Water Resource Engineering"
   https://youtu.be/EOOFN9yKkoY?si=lGtpWsGMoIl8MRCb
5. NPTEL Video lecture on "Geotechnical Engineering"
   https://youtu.be/5mwDneohPk4?si=0MLFlawh2zdGhZvN
6. NPTEL Video lecture on "Infrastructure Management"
   https://youtu.be/WZYwbyB6S6Q?si=ktHyXpAYsQOIdHol
7. NPTEL Video lecture on "Traffic Engineering and Planning"
   https://youtu.be/4ej1XkAvzhc?si=_D-DWfvhLj0KGog4
8. NPTEL Video lecture on "Structural Engineering – Analysis and Design"
   https://youtu.be/H0w4GFRW05M?si=QDKTVYlSamn2a9hH
9. NPTEL Video lecture on "Surveying"
   https://youtube.com/playlist?list=PL20A0651466E8A776&si=ulKIz8G2aAvHUGGj
10. NPTEL web-based learning material
    https://nptel.ac.in/courses/105107122
11. A video series of "Building Planning"
    https://youtube.com/playlist?list=PL46yD-wnVQqxZ8f-_g1PZaFjJIxnJWyFE&si=y3-kBrBf8sid2hiM
12. A video on "How to make a house plan step by step"
    https://www.youtube.com/watch?v=6XNpiqv2XPE&t=252s
13. A video on "House 3D building animation"
    https://youtu.be/CP6xetNWfQk?si=tF_RnO9NcnhhzFyZ

14. An animation on "Components of building"
    https://www.youtube.com/watch?v=Qftr8EeiiMs

15. An animation on "Building Construction Components"
    https://www.youtube.com/watch?v=LGC6Fg-0wso

16. A Video on "Building Construction"
    https://youtube.com/playlist?list=PLfq4fiRrJSn6UMXXmSsBcb_i2cR0hq8pA&si=-gHzBGLq-WAHrs8b

17. NPTEL Video on "Infrastructure planning and management"
    https://youtu.be/WZYwbyB6S6Q?si=LCKF2jvq-d4bBPJb

18. Geology and Earth Science News, Articles, Photos, Maps and More

19. The Mineral and Gemstone Kingdom: Home (minerals.net)

20. Geology and Earth Science News, Articles, Photos, Maps and More

21. Engineering Geology - Course (nptel.ac.in)

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering								**Semester: I**	
Course: Civil Engineering Science and Technology Lab								**Code:** 26CEES101P	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	-	50	-	50

Prerequisites:

Basic mathematics, Environmental studies, Geography

Course Objectives:

1. To develop students' practical skills in surveying, measurement, leveling, area determination, and preparation of building-related documentation.
2. To familiarize students with building planning requirements, bye-laws, construction materials, masonry, building components, and construction practices.

Course Outcomes: After the completion of course, students will be able to

CO1	Determine distances, bearings, elevations, areas, and dimensions using appropriate surveying instruments and techniques.
CO2	Prepare building-related drawings, reports, documentation, and compliance details based on relevant planning requirements and bye-laws.
CO3	Evaluate construction practices, materials, structural components, and modern infrastructure technologies through site visits, field observations, and practical activities.

Course Contents:

List of Experiments: (Any 08)

1. Measurement of internal components and capacity determination of any facility in the institute.
2. Measurement of magnetic bearings of sides of a triangle or quadrilateral, correction for local attraction and calculations of true bearings using prismatic compass.
3. Simple and differential leveling with at least three change points using dumpy or auto level.
4. Study of 7/12 and 8 (A) extract and list of documents to be submitted for building permission.
5. Measurement of area of irregular figures by planimeter.
6. Measurement of distance by EDM and comparing it with the distance measured using tape.
7. Preparation of report containing details of building bye-laws regarding building line, open space, carpet area, built up area requirements, Floor Space Index (F.S.I.) / Floor Area Ratio (F.A.R.) and height of building.
8. Drawings of types of masonry and brick bonds (Quarter plate).
9. Drawing details of doors, windows and arches (Quarter plate).
10. Visit to a construction site for studying the various construction materials used, type of structure, type of foundation and components of superstructure and preparation of visit report.
11. Collection of various sanction forms of building construction and brochures of construction materials including cost.
12. Making a poster (Full imperial sheet size) in a group of maximum 04 students, related to
13. infrastructure development and automation in Civil Engineering.

DEPARTMENT OF CIVIL ENGINEERING

Reference Books:

1. N.N. Basak, "Surveying", Tata Mc-Graw Hill Publications, Edition 2014.
2. Bindra and Arora, "Building Construction and Drawing", Dhanpat Rai Publications, Edition 2012.
3. Sushil Kumar, "Building Construction and Drawing", Standard Publications, Delhi, Edition 2010.
4. Kanetkar and Kulkarni, "Surveying and Levelling", PVG Publications, Edition 2014.
5. S.K. Garg, "Water Supply Engineering", Khanna Publishers, Delhi, 33rd Edition 2019.
6. Khanna, C.E. G Justo, A. Veersrsgavan, "Highway Engineering", Nem Chand and Bros Publication, Edition 2018.
7. S.C. Saxena, S.P. Arora, "Railway Engineering", Dhanpat Rai Publication, Edition 2015.
8. National Building Code –Bureau of Indian Standards 2016.

E-Resources:

1. NPTEL Video lecture on "What is Civil Engineering"
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   https://youtu.be/0aXP5qnihns?si=x6K6ZobHo8x2k9ty
3. NPTEL Video lecture on "Interesting Environmental Projects"
   https://youtu.be/LRsla_wsCTs?si=2xuETqFKA1ZNsM3i
4. NPTEL Video lecture on "Hydraulics and Water Resource Engineering"
   https://youtu.be/EOOFN9yKkoY?si=lGtpWsGMoIl8MRCb
5. NPTEL Video lecture on "Geotechnical Engineering"
   https://youtu.be/5mwDneohPk4?si=0MLFlawh2zdGhZvN
6. NPTEL Video lecture on "Infrastructure Management"
   https://youtu.be/WZYwbyB6S6Q?si=ktHyXpAYsQOIdHol
7. NPTEL Video lecture on "Traffic Engineering and Planning"
   https://youtu.be/4ej1XkAvzhc?si=_D-DWfvhLj0KGog4
8. NPTEL Video lecture on "Structural Engineering – Analysis and Design"
   https://youtu.be/H0w4GFRW05M?si=QDKTVYlSamn2a9hH
9. NPTEL Video lecture on "Surveying"
   https://youtube.com/playlist?list=PL20A0651466E8A776&si=ulKIz8G2aAvHUGGj
10. NPTEL web-based learning material
    https://nptel.ac.in/courses/105107122

11. A video series of "Building Planning"
    https://youtube.com/playlist?list=PL46yD-wnVQqxZ8f-g1PZaFjJIxnJWyFE&si=y3kBrBf8sid2hiM

12. A video on "How to make a house plan step by step"
    https://www.youtube.com/watch?v=6XNpiqv2XPE&t=252s

13. A video on "House 3D building animation"
    https://youtu.be/CP6xetNWfQk?si=tF_RnO9NcnhhzFyZ

14. An animation on "Components of building" https://www.youtube.com/watch?v=Qftr8EeiiMs

15. An animation on "Building Construction Components"
    https://www.youtube.com/watch?v=LGC6Fg-0wso

16. A Video on "Building Construction"
    https://youtube.com/playlist?list=PLfq4fiRrJSn6UMXXmSsBcb_i2cR0hq8pA&si=gHzBGLq-WAHrs8b

17. NPTEL Video on "Infrastructure planning and management"
    https://youtu.be/WZYwbyB6S6Q?si=LCKF2jvq-d4bBPJb

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19. The Mineral and Gemstone Kingdom: Home (minerals.net)

20. Geology and Earth Science News, Articles, Photos, Maps and More

21. Engineering Geology - Course (nptel.ac.in)

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Scientific Principles of Building Planning								**Code:** 26CEES102	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	-	-	02	40	60	-	-	-	100

Prerequisites:

Engineering Drawing, Building Materials & Construction, Basic Mathematics & Surveying

Course Objectives:

1. To equip students with the principles, requirements, regulations, and functional aspects of residential and public building planning.
2. Familiarize students with building safety, sustainability, accessibility, and relevant calculations such as FAR/FSI, setbacks, and ground coverage.

Course Outcomes: After the completion of course, students will be able to

CO1	Analyze and decide suitable building planning solutions based on site conditions, orientation, functional requirements, circulation, privacy, lighting, ventilation, and building bye-laws.
CO2	Implement basic fundamentals of Vaastushstra.
CO3	Evaluate and select appropriate building services, safety, accessibility, and sustainable planning measures, and calculate FAR/FSI, setbacks, and ground coverage.
CO4	Prepare and interpret site plans, layouts, floor plans, elevations, sections, foundation plans, roof plans, and working drawings using appropriate scales and conventions.
CO5	Select suitable building plan, properties, functional requirements, circulation, public buildings & National Building Code.
CO6	Determine basic building services like water supply, plumbing, sanitary, electrical, natural and artificial lighting, principles of natural and mechanical ventilation.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Principles of Building Planning** Introduction, Scope, objectives and basic requirements of building planning; classification; site selection and basic site investigation; orientation and factors affecting orientation; principles of residential planning; functional requirements and standard dimensions of residential rooms and building components, Role of Civil Engineers in the infrastructure development.	05
2.	**Fundamentals of Vaastushstra** Scientific background, life force energy, Importance of five elements, Identification of Vaastu defects, Rectification of Vaastu defects in existing buildings, color therapy.	04
3.	**Planning requirements** Introduction to Types of loads on buildings; Substructure – Types of soils; rocks and foundation strata; concept of bearing capacity; Types of foundation and their suitability; Superstructure –Types of construction; Load Bearing, Framed, and Composite structures.	04

4.	**Residential Planning** Basic planning of living room, bedroom, kitchen, dining, toilet, bathroom and staircase; introduction to building drawings, symbols, conventions, dimensions and furniture layout; building bye-laws and regulations including plot area, Carpet area, built up area, ground coverage, FAR/FSI, setbacks, margins, open spaces and building height.	04
5.	**Components of Public Buildings** Principles and types of building drawings; scales, conventional signs, symbols, lettering and dimensioning; preparation and interpretation of site plan, layout plan, floor plan, elevation, section, foundation plan and roof plan; basic planning principles, functional requirements and circulation in public buildings; types of public buildings, National Building Code specifications.	05
6.	**Building Services, Safety & Sustainable Planning** Introduction to basic building services; water supply and plumbing systems; sanitary and drainage systems; electrical services and basic electrical layout; principles of natural and artificial lighting; principles of natural and mechanical ventilation; basic fire protection, fire safety and emergency exits; basic accessibility requirements; rainwater harvesting and sustainable building	04
	TOTAL	**26**

Text Books:

1. R. B. Gupte, "Text Book of Engineering Geology", P.V.G. Publications, Pune, 2001.
2. N. Chenna Kesavulu, "Text Book of Engineering Geology", MacMillan India Ltd., 2010.
3. B.C. Punmia, "Building Construction", Laxmi Publications.
4. S. V. Deodhar, "Building Materials", Khanna Publication.

Reference Books:

1. Ancient science of vastu by Siddharth board & Dr. Jayashree Om.
2. Remedial Vastu for home by Janhavi N. Sahastrabudhhe & Narendra Hari Sahastrabudhhe
3. Scientic Vastushstra in home by Patel Sarjoo
4. D. Venkat Reddy, "Principles of Engineering Geology", Vikas Publishers, 2010.
5. F. G. Hbly and De Frietus, "Engineering Geology", Reed Elsevier India.
6. S. K. Duggal, "Building Materials", New Age International Publishers.
7. D.N. Ghose, "Materials of Construction", Tata McGraw Hill.
8. B. K. Agrawal, "Introduction to Engineering Materials", Tata McGraw Hill, New Delhi.
9. Bindra and Arora, "Building Construction", Dhanpat Rai Publications.
10. Ruth T. Brantley and L. Reed Brantley, "Building Materials Technology", Tata McGraw Hill.
11. S. K. Garg, "Physical and Engineering Geology", Khanna Publication.
12. Parbin Sing, "Engineering and General Geology", Katson Books.

DEPARTMENT OF CIVIL ENGINEERING

E-Resources:

1. Building Materials and Construction by Dr .B.Bhattacharjee, Department of Civil Engineering,IIT Delhi
   https://www.youtube.com/watch?v=EIDXE28_8eQ&list=PL8BA090E69BF01BC2

2. Building Materials and Composites, IIT Kharagpur
   https://nptel.ac.in/courses/124105013

3. Introduction to Urban Planning, IIT Roorkee
   https://nptel.ac.in/courses/124107158

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Professional Practices in Building Planning and Drawing								**Code:** 26CEVS101	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	04	-	02	-	-	-	-	50	50

Prerequisites:

Basic Civil Engineering, Basics of building planning and drawing

Course Objectives:

1. To acquaint the students with the broad scope of the different sub-branches of civil engineering.
2. To acquaint the students with basic principles of surveying and applications of surveying instruments.
3. To acquaint the students with the elements of buildings, as well as planning & construction methods of buildings.

Course Outcomes: After the completion of course, students will be able to

CO1	Utilize appropriate drawing sheets, scales, symbols, lines, and dimensioning styles.
CO2	Apply principles of planning and building byelaws.
CO3	Produce accurate orthographic and isometric drawings of various objects and perspective drawings of buildings.
CO4	Create detailed plans, sections, and elevations of engineering components and buildings.
CO5	Design line plans for residential and public buildings collaboratively.
CO6	Draft site plans with integrated water supply and drainage systems.

Course Contents:

List of Experiments:

1. Drawing containing types of scales and symbols.
2. Drawing of types of lines and dimensioning style (Lettering) in Engineering Drawing.
3. Drawing an orthographic view of various objects such as cube and cuboid.
4. Drawing isometric views of simple objects.
5. Perspective drawing of a building.
6. Drawing simple line plan for a residential building, single storied framed/load bearing structure indicating water supply and drainage line (on Graph paper).
7. Drawing of line plan for any single storeyed public building indicating water supply and drainage line (on Graph paper). \
8. Drawing of plan, elevation and section for a proposed residential building, single storeyed framed/load bearing structure, preparing schedule of openings.

Reference Books:

1. David A. Madsen, David P. Madsen, and Terence M. Shumaker, "Engineering Drawing and Design", Cengage Learning, Edition 2018.
2. S.C. Rangwala, "Civil Engineering Drawing", Charotar Publishing House Pvt. Ltd., Edition.
3. M.N. Shrinivas, "Basic Civil Engineering Drawing", Sanguine Technical Publishers, Edition.

DEPARTMENT OF CIVIL ENGINEERING

E-Resources:

1. A video series of "Building Planning"
   https://youtube.com/playlist?list=PL46yD-wnVQqxZ8f-g1PZaFjJIxnJWyFE&si=y3-kBrBf8sid2hiM

2. A video on "How to make a house plan step by step
   https://www.youtube.com/watch?v=6XNpiqv2XPE&52s

3. A video on "House 3D building animation",
   https://youtu.be/CP6xetNWfQk?si=tF_RnO9NcnFyZ

4. An animation on "Components of Building"
   https://www.youtube.com/watch?v=Qftr8EeiiMs

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Professional Development – I								**Code:** 26CECC101	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
01	02	-	02	-	-	50	-	-	50

Course Objectives:

1. To introduce students on professional development skills and its importance in building personal and professional life.
2. To inculcate soft skills like goal setting, time management, emotional intelligence, leadership etc required in today's professional environment.
3. To make students aware of employability skills like workplace communication, correspondence at work, team work and workplace etiquette to imbibe better employability maturity.

Course Outcomes: After completion of this course, students will be able to -

CO1	Know their own values, significance of discipline, self-grooming applied effectively in career, personal life, at workplace, society and professional world.
CO2	Understand the importance of necessity of various soft skills required in today's professional workplace environment for better growth and leadership perspective.
CO3	Aware of significance of emotional intelligence at workplace and tapping leadership opportunities at engineering and technological organizations.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Values:** Types of Values, Internal and External Stakeholders, SWOT analysis **Self-discipline:** Self-discipline impact in your life and society, Techniques to build self-discipline, Self-review and actions. **Self-Grooming**: Meaning and significance of self-grooming at personal, organizations, social and professional Level.	13
2.	**Soft Skills basics (Personal orientation):** Soft Skills and hard skills, soft skills cultivation techniques. **Attitude:** positive self-talk, self-esteem, adaptability **Goal Setting:** SMART goals, guidelines for goal setting types of goals, goals at workplace, cascading goals **Time Management:** Prioritization, time stressors, time stealers time management matrix productivity pyramid	13
3.	**Soft Skills Advanced (Professional and Social orientation)** Emotional Intelligence: enhancing your emotional awareness, change and stress, crisis management **Leadership:** Leadership and assertiveness, problem solving and brain storming, leader attributes, types of leaders, leader features in a professional environment Social Consciousness.: Social awareness and civic responsibility, social intelligence, social inclusion, social entrepreneurship sustainable development and conversation of resources	13

TOTAL	**39**

Text Books:

1. M. K. Sinha, "Success Through Self-Discipline: Your Personal Guide to Achieving Your Goals"
2. Sabina Pillai, Agna Fernandez," Soft Skills and Employability Skills" Cambridge Press
3. Sanjay Kumar & Pushpa Latta, commination skills "Oxford higher education
4. Minakshi Raman & Sangita Sharma, "Technical Communication, Principal & Practices", Oxfords Press.

Reference Books:

1. Stephen R. Covey, "The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change", Simon & Schuster, 1989.
2. Jack Canfield, "The Success Principles", HarperCollins, 2005.
3. Norman Vincent Peale, "The Power of Positive Thinking", Prentice Hall, 1952.

E-Resources:

1. Coursera: "The Science of Well-Being" by Yale University, - https://www.coursera.org/learn/the-science-of-well-being

2. Udemy: "Self-Care: Take Care of Yourself to Better Take Care of Others" by Jessica Rogers https://www.udemy.com/course/caring-self/?couponCode=UPGRADE02223

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Guitar)								**Code:** 26CECC102A	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Basic knowledge of Indian classical music and Guitar musical instrument.

Course Objectives:

1. To build a strong foundation in Indian classical dance through mastering basic techniques, rhythms, expressions, and repertoire, culminating in a performance.

Course Outcomes: After completion of this course, students will be able to -

CO1	Illustrate the fundamental aspects of Guitar instrument.
CO2	Demonstrate the performance of Guitar Instrument.
CO3	Apply different types Chords.
CO4	Apply basic outline through various prescribed ragas practically.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Introduction to the Guitar	02
2.	Understanding standard tuning	02
3.	Introduction to tablature and note reading	02
4.	Introduction to basic music theory concepts	02
5.	Understanding scale, intervals, and chords	02
6.	Learning more open chords: D major, D minor, C major, G major	02
7.	Understanding power chords and their shapes	02
8.	Understanding barre chord shapes: F major, B minor	02
9.	Finding Chords by Ear	02
10.	Chord Progressions	02
11.	Advanced Chord Types	02
12.	Transposing Chord	02
13.	Review and Practice	02
14.	Introduction to Scales	02
	TOTAL	**28**

Text Books:

1. David Hodge, "Guitar Theory", DK Publishing.

Reference Books:

1. Russ Shipton, "The Complete Guitar Player", Published by Wise.
2. Vincent Ong, Alfred Khp," Classical Guitar Advanced Studies Repertoires", Dynamic Publication.

E-Resources:

1. https://www.youtube.com/watch?v=BBz-Jyr23M4

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Singing)								**Code:** 26CECC102B	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Basic knowledge of Indian classical music in singing.

Course Objectives:

1. To offer students' knowledge of the basic concepts of Singing in a very easy to understand manner with their practical applicability.

Course Outcomes: After completion of this course, students will be able to -

CO1	Illustrate the fundamental aspects of Singing.
CO2	Demonstrate the performance of Singing.
CO3	Apply basic outline through various prescribed ragas practically.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Voice Culture in Indian Semi Classical Singing.	02
2.	Basics of Singing o Introduction to semi classical singing.	02
3.	Basics of Indian Semi Classical Music.	02
4.	Learning Basic Ragas.	02
5.	Music Theory Basics.	02
6.	Vocal Warm-ups.	02
7.	Introduction to Ear Training.	02
8.	Breathe Control.	02
9.	Resonance and Tone Production.	02
10.	Diction and Articulation.	02
11.	Dynamics and Expression.	02
12.	Introduction to Repertoire.	02
13.	Practice Techniques.	2
14.	Interpretation and Expression.	2
	TOTAL	**28**

Text Books:

1. Dr. Theodore Dimon, "Anatomy of the Voice, This Is a Voice".

Reference Books:

1. Richard Miller, "The Structure of Singing", Schirmer Books, London.
2. Jennifer Hamady, "The Art of Singing", Published by Hal Leonard.

E-Resources:

1. https://www.youtube.com/watch?v=4hNq9qykOyE
2. https://www.youtube.com/watch?v=b14gkmECz-Y

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Cinematography)								**Code:** 26CECC102C	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

A basic understanding of film theory, Camera operation, Lighting techniques and visual storytelling is essential for cinematography.

Course Objectives:

1. To make students effectively use their camera's components, study fundamental photography techniques and apply basic to advanced editing skills.

Course Outcomes: After completion of this course, students will be able to -

CO1	Illustrate the fundamental aspects of camera equipment.
CO2	Demonstrate the performance of camera equipment
CO3	Ability to translate creative concepts into visually engaging and coherent film or video projects.
CO4	Mastery in crafting compelling visual narratives through camera angles, lighting, and composition

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Introduction to Photography	02
2.	Understanding camera components (lens, shutter, sensor)	02
3.	Exposure Triangle	02
4.	Introduction to the rule of thirds, leading lines, and framing	02
5.	Understanding autofocus vs. manual focus	02
6.	Introduction to natural and artificial lighting	02
7.	White Balance and Color Theory	02
8.	Motion and Long Exposure	02
9.	Basics of portrait photography	02
10.	Basics of landscape photography	02
11.	Overview of post-processing software (e.g., Adobe Light room, Photoshop)	02
12.	Introduction to advanced editing tools	02
13.	Organizing and Storing Photos	02
14.	Final Project Presentation and Review	02
	TOTAL	**28**

Text Books:

1. Tania Hoser, "Introduction to Cinematography", Taylor & Francis.

Reference Books:

1. Anat Pick, "Screening Nature", Berghahn Books.
2. Blain Brown, "Cinematography: Theory and Practice", Taylor & Francis.

E-Resources:

1. https://youtu.be/V7z7BAZdt2M?si=to4yQ46zEKRbxKOm
2. https://youtu.be/WXdAX0No2hM?si=GZu_mJsmyJ7NGnAU

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Dance)								**Code:** 26CECC102D	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Good stamina, flexibility and familiarity with simple rhythmic patterns and beats.

Course Objectives:

1. To build a strong foundation in Indian classical dance through mastering basic techniques, rhythms, expressions, and repertoire, culminating in a performance.

Course Outcomes: After completion of this course, students will be able to -

CO1	Understand the fundamental postures, hand gestures and basic steps of Indian classical dance.
CO2	Understand and perform dance sequences to various rhythmic cycles (Tala) with confidence.
CO3	Convey emotions and stories through facial expressions (Abhinaya) and body language.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Overview of Indian Classical Dance	02
2.	Fundamental Postures and Hand Gestures (Hasta Mudras)	02
3.	Introduction to Basic Steps (Adavus or Tatkars)	02
4.	Rhythmic Patterns and Clapping (Tala)	02
5.	Advanced Basic Steps	02
6.	Strength and Conditioning	02
7.	Introduction to Basic Expressions (Abhinaya)	02
8.	Integrating Steps and Expressions	02
9.	Intermediate Rhythmic Patterns	02
10.	Improvisation and Creative Movement	02
11.	Introduction to Advanced Movements	02
12.	Review and Feedback	02
13.	Learning a Simple Dance Piece - Part 1	02
14.	Learning a Simple Dance Piece - Part 2	02
	TOTAL	**28**

Text Books:

1. Padma Subrahmanyam, "Indian Classical Dance: A Beginner's Manual", Abhinav Publications.

Reference Books:

1. Dr. Aditi Sriram, "Indian Classical Dance: A Guide", Vikas Publishing House.

E-Resources:

1. https://youtu.be/5apCTHzvkWI?si=p11CR_4XxPocTbjO
2. https://youtu.be/OIKOHzePJCA?si=7pnPZKuvfT5EIWhf

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Synthesizer/Keyboard)								**Code:** 26CECC102E	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Basic knowledge of Indian classical music and Keyboard musical instrument.

Course Objectives:

1. To offer students' knowledge of the basic concepts of playing Keyboard in a very easy to understand manner with their practical applicability.

Course Outcomes:

CO1	Illustrate the fundamental aspects of Keyboard instrument.
CO2	Demonstrate the performance of Keyboard Instrument.
CO3	Apply different types of Chords.
CO4	Apply basic outline through various prescribed ragas practically.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Introduction to the Keyboard	02
2.	Understanding Notes and Keys	02
3.	Basic Music Theory	02
4.	Introduction to the C major scale	02
5.	Learning to play simple melodies in C major	02
6.	Introduction to Chords	02
7.	Combining Melodies and Chords	02
8.	Review and practice melodies and chords	02
9.	Introduction to Minor Scales	02
10.	Introduction to additional chords (D major, E minor)	02
11.	Understanding chord progressions (e.g., I-IV-V)	02
12.	Review scales, chords, and progressions	02
13.	Introduction to Arpeggios	2
14.	Dynamics and Expression	2
	TOTAL	**28**

Text Books:

1. Chuan C. Chang, "Fundamentals of Piano Practice", Create space Independent Publishing Platform.

Reference Books:

1. Michael Rodman, "Keyboard for the Absolute Beginners", Alfred Publishing.
2. Davis Dorrough, "Piano Scales".

E-Resources:

1. https://youtu.be/2mPS-2guHVo?si=8X_4KKezIdrMejLH
2. https://youtu.be/tEtukfFv3Wk?si=2iJ8wdD0dfjWauPb

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Basketball)								**Code:** 26CECC102F	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop foundational basketball skills, including dribbling, passing, shooting, and defense, while understanding game rules and strategies through practical gameplay and scrimmage.

Course Outcomes: After completion of this course, students will be able to -

CO1	Demonstrate basic basketball skills such as dribbling, passing, shooting, and defensive fundamentals effectively.
CO2	Apply offensive and defensive strategies, including transition play, during gameplay and scrimmages.
CO3	Understand and implement basketball game rules and referee gestures accurately in practical situations.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**History & Introduction to Basketball:** History & introduction to the game, equipment, safety. Understand the basic rules.	02
2.	**Terminology & Dimensions:** Terms used in basketball and measurements of the court.	02
3.	**Warmup & Cooldown:** Basics of warmup & cooldown for preventing stiffness and injury and speedy recovery.	02
4.	**Player Stance & Ball Holding:** Learn the ready position and correct way to hold the basketball. Demonstrate proper stance and secure ball control.	02
5.	**Passing & Receiving (Chest):** Practice accurate chest passing and receiving techniques. Perform chest pass with proper technique and accuracy.	02
6.	**Passing & Receiving (Bounce):** Learn bounce passing and receiving while stationary. Execute bounce passes confidently.	02
7.	**Assessment – I**	02
8.	**Dribbling (Stationary):** Practice basic dribbling using both hands. Control the basketball while stationary.	02
9.	**Dribbling (Movement-Walk/Jog/Run):** Develop dribbling while walking and changing direction maintain ball control while moving.	02
10.	**Shooting (Technique & Set Shot):** Learn the basic shooting technique. Perform a set shot with correct body mechanics.	02
11.	**Shooting (Lay-Up):** Practice right- and left-hand lay-up technique. Execute basic lay-up shots effectively.	02
12.	**Rebounding:** Learn positioning and timing for offensive and defensive rebounds. Demonstrate correct rebounding technique.	02
13.	**Individual Defense:** Practice defensive stance and movement. Apply basic	02

	individual defensive skills.	
14.	**Assessment – II**	02
	TOTAL	**28**
Text Books:		
1. K.K. Sharma, "Basketball: Skills and Drills", Sports Publications.		
Reference Books:		
1. Dr. P.K. Kher, "Basketball Coaching: A Complete Guide", Khel Prakashan. 2. S. Reddy, "The Ultimate Guide to Basketball Training", Blue Rose Publisher.		
E-Resources:		
1. Introduction to Exercise Physiology & Sports Performance, IIT Madras, https://nptel.ac.in/courses/109106406		

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Cricket)								**Code:** 26CECC102G	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To enhance cricket skills from basics to advanced techniques, focusing on tactics, fitness, and specialized fielding and wicket keeping through targeted practice and match simulations.

Course Outcomes: After completion of this course, students will be able to -

CO1	Master fundamental and advanced cricket techniques, including batting, bowling, and specialized fielding and wicket keeping.
CO2	Demonstrate an understanding of game scenarios and tactical strategies, applying them effectively during match simulations and pressure situations.
CO3	Improve physical fitness, strength, and conditioning, with targeted skill enhancement and mid-season assessments to track progress.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Introduction to Cricket, History & Evolution:** Understand the Origin, Formats, and Growth of Cricket	02
2.	**Laws of Cricket & Spirit of the Game:** Learn MCC Laws and Fair Play	02
3.	**Cricket Ground, Pitch & Equipment:** Identify Dimensions and Equipment	02
4.	**Warm-Up, Stretching & Physical Fitness:** Develop basic fitness routines	02
5.	**Grip, Stance & Ready Position:** Learn Correct Batting Fundamentals	02
6.	**Front Foot/ Back Foot Batting Techniques:** Practice defensive and attacking strokes/ execute pull, cut, and back-foot defence	02
7.	**Assessment - I**	02
8.	**Bowling Grip & Run-Up:** Learn bowling basics	02
9.	**Pace Bowling Fundamentals:** Develop seam and swing basics	02
10.	**Spin Bowling Fundamentals:** Learn finger and wrist spin techniques	02
11.	**Fielding Basics:** Catching, throwing, and ground fielding	02
12.	**Wicket keeping Fundamentals:** Basic stance, catching, and footwork	02
13.	**Mini Match Practice:** Apply learned skills	02
14.	**Assessment - II**	02
	TOTAL	**28**

Text Books:

1. Sanjay Manjrekar, "Cricket Fundamentals", Orient BlackSwan
2. Ravi Shastri, "Winning Cricket: Skills and Strategies", Notion Press

DEPARTMENT OF CIVIL ENGINEERING

Reference Books:
1. Sachin Tendulkar, "Playing It My Way", Hachette India 2. Rahul Dravid, "Cricket: The Game of Life", Penguin India
E-Resources:
1. Sports and Performance Nutrition, IIT Madras https://onlinecourses.nptel.ac.in/noc24_hs82/

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Rifle and Pistol Shooting)								**Code:** 26CECC102H	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop fundamental skills in rifle and pistol shooting through technical knowledge, practical drills, and mental preparation for competitive performance.

Course Outcomes: After completion of this course, students will be able to -

CO1	Master fundamental and advanced shooting techniques for both rifle and pistol, including aiming, breathing, and triggering.
CO2	Develop strong mental focus and relaxation techniques essential for high-performance shooting and competition readiness.
CO3	Gain hands-on experience in live shooting drills and positional shooting, preparing them for competitive shooting scenarios.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Introduction to Shooting Sports and Course Orientation:** History of shooting, information about guns.	02
2.	**Safety Rules, Range Etiquette and ISSF rules:** Rules that should be followed on range and during competitive matches.	02
3.	**Events (Rifle & Pistol):** Information about all different events.	02
4.	**Parts and Functions of gun:** Knowledge about all the parts and how it works	02
5.	**Shooting Equipment and Accessories:** Information about equipment's and it work	02
6.	**Range Commands and Safe Handling:** Regulations followed during rifle and pistol shooting competition. Maintaining discipline, following safety instructions, handling rifle responsibly.	02
7.	**Assessment - I -(Theory and Practical):** Evaluation based on history of game, safety rules and ISSF rules.	02
8.	**Shooting Stance:** Upright posture where the shooters balance the body while supporting the rifle steadily	02
9.	**Grip Techniques:** Proper grip and its techniques	02
10.	**Sight Alignment:** How to align sight with target	02
11.	**Sight Picture:** Sight picture definition and its visualization	02
12.	**Breathing Control:** Breathing techniques	02
13.	**Trigger Control:** Proper triggering and its steps	02
14.	**Follow-Through:** Importance of follow through and its process	02
	TOTAL	**28**

Reference Books:
1. David Watson, "ABCs of Rifle Shooting", Gun Digest (Imprint of KP Books), 2014
E-Resources:
1. Introduction to Exercise Physiology & Sports Performance, IIT Madras, https://nptel.ac.in/courses/109106406

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Volleyball)								**Code:** 26CECC102I	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop foundational volleyball skills, including serving, passing, setting, spiking, and blocking, while mastering game rules and strategies through practical gameplay and scrimmage.

Course Outcomes: After completion of this course, students will be able to -

CO1	Demonstrate proficiency in basic volleyball skills such as serving, passing, setting, spiking, and blocking.
CO2	Apply offensive and defensive strategies effectively, including serve receive and transition play, during gameplay.
CO3	Understand and implement volleyball rules and referee gestures, applying them accurately during practical gameplay and scrimmages.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Introduction to Volleyball, History:** Introduction to volleyball, origin and development of the game, inventor (William G. Morgan), evolution of volleyball at national and international levels, governing bodies (FIVB, VFI), importance and benefits of volleyball, basic objectives of the game.	02
2.	**Terminology:** Basic volleyball terminology: rally, serve, receive, pass, set, spike, dig, block, libero, rotation, substitution, attack line, service zone, front row, back row, side-out, fault, ace, rally point system, timeout and other common terms.	02
3.	**Rules, Court Dimensions:** Volleyball court dimensions (18 m × 9 m), attack line, service zone, free zone, net height (Men: 2.43 m, Women: 2.24 m), ball specifications, team composition, scoring system, rotation rules, basic violations and referee signals.	02
4.	**Fundamental Stance and Movement:** Ready position, defensive and offensive stance, body balance, footwork techniques, forward, backward, lateral and crossover movement, movement efficiency, maintaining proper posture during play.	02
5.	**Ball Familiarization and Hand-Eye Coordination:** Ball handling exercises, ball bouncing, self-tossing, partner toss, catching drills, wall passing, coordination drills, reaction exercises and confidence-building with the volleyball.	02
6.	**Passing Skill (Dig Pass):** Underhand pass (forearm pass): body position, platform formation, foot placement, contact point, follow-through, partner passing drills, movement before contact, common mistakes and corrective exercises.	02
7.	**Assessment - I**	02
8.	**Passing Skill (Volleypass):**Hand position, finger contact, body alignment, extension of arms and legs, partner setting drills, wall setting, accuracy exercises, common errors and corrections.	02
9.	**Underhand Service:** Grip, stance, ball toss, arm swing, point of contact, follow-	02

	through, target serving, serving consistency drills and correction of common faults.	
10.	**Overhand Service:** Proper toss, striking technique, body mechanics, weight transfer, accuracy, power generation, target practice, introduction to float serve, error correction.	02
11.	**Revision and Integrated Skill:** Revision of all previously learned skills, combining passing, setting and serving in continuous drills, partner and group activities, communication, teamwork and basic game situations**.**	02
12.	**Hitting Mechanics:** Introduction to attacking technique: approach steps, arm swing, jump mechanics, body coordination, and timing, landing technique, hitting drills without net and with controlled tosses.	02
13.	**Introduction to Spiking:** Basic spiking technique: 3-step/4-step approach, take-off, arm action, ball contact, follow-through, landing safely, simple attacking drills and introduction to offensive play.	02
14.	**Assessment - II**	02
	TOTAL	**28**

Text Books:

1. Jitendra Kumar, "The Complete Guide to Volleyball", Blue Rose Publisher

Reference Books:

1. N. Ramachandran, "Volleyball: Steps to Success", Sports Publication

E-Resources:

1. https://coachtube.com/course/volleyball/volleyball-for-beginners/7004

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Liberal Learning – I (Football)								**Code:** 26CECC102J	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To enhance players' technical skills, tactical understanding, physical fitness, teamwork, and sportsmanship, fostering a comprehensive understanding and appreciation of the game.

Course Outcomes: After completion of this course, students will be able to -

CO1	To identify and describe the fundamental skills and strategies involved in football, including ball control, dribbling techniques, basic offensive and defensive tactics.
CO2	To apply advanced dribbling and passing techniques during practice sessions.
CO3	To design and execute a cohesive game plan that integrates set pieces, team chemistry, and communication, evaluating its effectiveness through simulation matches.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Introduction to Football: History & Development:** Understand the history, origin, and global development of football, including its evolution into the world's most popular sport.	02
2.	**Laws of the Game:** Understand and apply the fundamental Laws of the Game, including rules, fouls, player positions, and match procedures.	02
3.	**Football Field, Equipment & Safety:** Identify the dimensions of a football field, use essential equipment correctly, and follow key safety practices to ensure safe participation in football.	02
4.	**Warm-up, Cool-down & Injury Prevention:** Demonstrate proper warm-up and cool-down techniques and apply injury prevention practices to enhance performance and reduce the risk of injuries.	02
5.	**Physical Fitness for Football:** Develop the physical fitness components—strength, speed, endurance, agility, flexibility, and coordination—required for effective football performance.	02
6.	**Ball Familiarization:** Develop confidence and control by performing basic ball familiarization exercises using both feet to improve touch, coordination, and ball control.	02
7.	**Assessment - I**	02
8.	**Long Passing & Lofted Pass:** Execute accurate long and lofted passes with proper technique, power, and precision to effectively switch play and create attacking opportunities.	02
9.	**Receiving and First Touch:** Demonstrate effective receiving and first-touch techniques to control the ball quickly and prepare for the next action in play.	02

10.	**Dribbling Fundamentals:** Demonstrate fundamental dribbling techniques to maintain close ball control while moving with speed, balance, and confidence.	02
11.	**Turning & Shielding the Ball:** Demonstrate effective turning and shielding techniques to protect the ball, maintain possession, and evade opponents under pressure.	02
12.	**Heading Techniques:** Demonstrate correct heading techniques using proper timing, body position, and contact to effectively control, clear, and direct the ball.	02
13.	**Small-Sided Game (5v5):** Apply football skills, decision-making, teamwork, and tactical principles effectively in a 5v5 small-sided game environment.	02
14.	**Assessment-II**	02
	TOTAL	**28**
Text Books:		
1. Srinivasan J. B, "Football Coaching: A Comprehensive Guide", Sports Publishing.		
Reference Books:		
1. Rob Ellis, "The Complete Guide to Coaching Soccer", Meyer & Meyer Sport.		
E-Resources:		
1. Udemy – Soccer Courses https://www.udemy.com/topic/soccer/		

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** I	
Course: Indian Knowledge System and Financial Literacy								**Code:** 26CEIK101	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	-	-	02	-	-	50	-	-	50

Prerequisites:

Basic knowledge of algebra and mathematical operations.

Course Objectives:

1. To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of roots of Indian Knowledge System.
2. To make students proficient in fundamental financial concepts essential for managing personal finances effectively.
3. To equip students with practical budgeting skills to empower them to achieve financial independence.

Course Outcomes: After completion of this course, students will be able to -

CO1	Understand IKS fundamentals, Indian numeral system, and key contributions in mathematics and measurement.
CO2	Recognize metal working techniques, Vastushastra principles, historical engineering and architecture practices.
CO3	Understand financial concepts, money types, bank accounts, and essential financial terms for practical application.
CO4	Manage budgets, credit, loans, and develop financial plans for career and education goals.
CO5	Understand various investments, risk management, insurance types, and develop retirement planning strategies.
CO6	Comprehend tax forms, compliance, fraud protection, and financial considerations for investments and business.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Foundations of Indian Knowledge System:** Definition and scope of IKS, Historical development and significance. **Number System and Units for Measurement**: Salient features of the Indian numeral system, The discovery of zero and its importance, Decimal Systems, Measurement of time, distance and weight. **Mathematics**: Unique aspects of Indian mathematics, Great mathematicians and their significant contributions in the area of arithmetic, algebra, geometry, trigonometry, binary mathematics.	05
2.	**Application of Indian Knowledge System:** Metals and Metal Working: Mining and ore extraction, Extraction of iron from Biotite by indigenous techniques, Lost wax casting of idols and artefacts, Architecture and Structures: Vastushastra, Unitary buildings and Town planning, Temple architecture. Physical structures in India, Irrigation and water management	05

3.	**Finance:** Importance of Financial Literacy for Engineers, Understanding Money, Types of Money- Cash, Cheque, UPI Payment, Digital Currency, etc Types of bank accounts - saving, salary, current, loan, etc., Basic financial Terms- Income, Expenditure, Balance, saving, loan, interest rates, compound interest rate, credit, Investment, Taxes.	04
4.	**Financial Planning:** Personal budgeting, Understanding debit and credit card, credit score, Types of credit card, credit card payment cycle, Barrowing, Loans / Debts, Types of loans, Terms of barrowing, Loan, Interest rate, Principal, EMI, EMI Calculation, Repayment of loan/debt strategy, Financial Planning for Career Development, Higher studies,	04
5.	**Investment and Wealth Management:** Basics of Investing, Effect of compounding, Types of Investment (fixed deposit, recurring deposits, Insurance policies, Bonds, Mutual Funds, Stocks, real estate, etc.) Risk and Return, Concept of SIP, STP and SWP, Stock Market, Stock Exchanges, reading of stock market indices, Life insurance, healthcare insurance, vehicle insurance, Importance of early retirement planning, Investment strategy, Pension Plan, Portfolio management,	04
6.	**Finance Compliance:** Types of Taxes, Types of Income Tax return form and Filling, Taxes and reforms, Impact of taxation policy on Investment, Scams and Frauds, Protection of personal information, Financial consideration for starting business, Real estate and purchase	04
	TOTAL	**26**

Text Books:

1. B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pawana R. N., "Introduction to Indian Knowledge System – Concepts and Applications", PHI Learning Pvt. Ltd., New Delhi.
2. Dr. Babu V., Mr. Mohammed Umair, "Financial Literacy", Himalaya Publishing House, First Edition.

Reference Books:

1. A. K. Bag, "History of Technology in India", Vol. I, Indian National Science Academy, New Delhi.
2. Dr. S. Gurusamy, "Indian Financial System", Tata McGraww-Hill Education Pvt. Ltd 2nd Edition.
3. D.N. Bose, S.N. Sen and B. V. Subbarayappa, "A Concise History of Science in India", Indian National Science Academy, New Delhi.

E-Resources:

1. SWAYAM - "Indian Knowledge System(IKS): Concepts and Applications in Engineering", Indian Institute of Management Bangalore (IIMB), Chanakya University, Bangalore. https://onlinecourses.swayam2.ac.in/imb23_mg53/preview
2. SWAYAM - "Introduction to Banking and Financial Markets", Indian Institute of Management Bangalore (IIMB), - https://onlinecourses.swayam2.ac.in/imb23_mg14/preview
3. Online free course on "Financial Literacy" by Khan Academy. https://www.khanacademy.org/college-careers-more/financial-literacy/xa6995ea67a8e9fdd:welcome-to-financial-literacy

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS

SEMESTER - II

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)									**Semester:** II
Course: Engineering Mathematics - II									**Code:** 26CEBS203
Teaching Scheme (Hrs/Week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	-	-	03	40	60	-	-	-	100

Prerequisites:

Basic concept of Differentiation, Integration and Vector.

Course Objectives:

1. To introduce student some methods to find the solution of first order & first degree ordinary differential equations with its applications.
2. To make students familiar with vector differentiation.
3. To acquaint the student with mathematical tools needed in evaluating improper integrals, multiple integrals and their usage.

Course Outcomes: After completion of this course, students will able to -

CO1	Solve first order ordinary differential equation.
CO2	Apply differential equation in engineering applications.
CO3	Find the velocity vector, gradient, divergence, curl.
CO4	Evaluate improper integrals.
CO5	Set up and solve multiple integrals for regions in the plane.
CO6	Use of multiple integrals to find area bounded by curves & volume bounded by surfaces.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**First Order Ordinary Differential Equation:** Exact differential equations, Equations reducible to exact form. Linear differential equations, Equations reducible to linear form and Bernoulli's equation.	07
2.	**Applications of Differential Equations:** Applications of differential equations to orthogonal trajectories, Newton's law of cooling, Kirchhoff's law of electrical circuits, Rectilinear motion, Simple harmonic motion, One dimensional conduction of heat.	07
3.	**Vector Differential Calculus:** Velocity vector, acceleration vector, tangential and normal component of acceleration, Vector differential operator, gradient, directional derivatives, angle between surfaces, Divergence and curl, solenoidal and irrotational field	07
4.	**Integral Calculus:** Reduction formulae, Beta and Gamma functions, Differentiation under integral sign and Error functions.	06
5.	**Multiple Integrals:** Double integration in cartesian & polar coordinates, Change of order of integration, Triple integral in cartesian & polar coordinates.	06
6.	**Applications of Multiple Integral:** Applications to find Area, Volume, Mass, Centre of gravity and Moment of inertia.	06
	TOTAL	**39**

DEPARTMENT OF CIVIL ENGINEERING

Text Books:

1. B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill.
2. B. S. Grewal , "Higher Engineering Mathematics" , Khanna Publication
3. H. K. Dass, "Higher Engineering Mathematics", S. Chand Publication
4. C. Ray Wylie & L. Barrett, "Advanced Engineering Mathematics", McGraw Hill Publications.

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd.
2. M. D. Greenberg , "Advanced Engineering Mathematics" , Pearson Education
3. Peter V. O'Neil , "Advanced Engineering Mathematics" , Thomson Learning
4. P. N. Wartikar and J. N. Wartikar, "Applied Mathematics (Vol. I & Vol. II)", Vidyarthi Griha Prakashan, Pune.
5. Ron Larson and David C. Falvo, "Elementary Linear Algebra" , Houghton Mifflin Harcourt Publishing Company

E-Resources:

1. A NPTEL Course on "Engineering Mathematics-II" IIT Khargpur - https://youtube.com/playlist?list=PLbRMhDVUMngeVrxtbBzn8HvP8KAWBpI5&si=3xAONJdT2ph_jcvG

2. Applications of Differential Equations | Orthogonal Trajectories - https://www.youtube.com/watch?v=Ziu0y2kWTCM&list=PLT3bOBUU3L9juyFTI3lpeXXhIetVB00cr

3. "Applications of Differential Equations| Newton's law of Cooling –" https://www.youtube.com/watch?v=gJSvcf9_Duc

4. Dr. Gajendra Purohit, "Gradient of a Scalar Field & Directional Derivative | Normal Vector" https://www.youtube.com/watch?v=9CHfHuFBTw8&list=PLU6SqdYcYsfJz9FAzbgocIjlkw4NXAar-&index=2

5. Dr. Gajendra Purohit, "Double Integral & Area By Double Integration | Multiple Integral" https://www.youtube.com/watch?v=db7d_a0wiUg&list=PLU6SqdYcYsfLoKyzF_dwxAQf8lIi6VC54

6. Double Integration - Change of Order of Integration | Cartesian & Polar https://www.youtube.com/watch?v=fXMyLYwBB3s&list=PLU6SqdYcYsfLoKyzF_dwxAQf8lIi6VC54&index=4

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)									**Semester:** II
Course: Engineering Chemistry									**Code:** 26CEBS204
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	-	-	02	40	60	-	-	-	100

Prerequisites:

Basic knowledge of volumetric analysis, structure property relationship, classification and properties of polymers, electromagnetic radiation, electrochemical series.

Course Objectives:

1. To familiarize the students with the basic phenomenon/concepts of chemistry and its applications in various fields of Engineering.
2. To impart knowledge of technologies involved in water analysis to improve water quality.
3. To learn significance science of corrosion and preventive methods used for minimizing corrosion.
4. To understand structure, properties and applications of speciality polymers and nanomaterials.

Course Outcomes: After completion of this course, students will be able to -

CO1	Analyze water softening parameters.
CO2	Utilize different analytical methods for analysis of various chemical compounds.
CO3	Understand the mechanism of destruction of metals (corrosion) and effective preventive measures.
CO4	Explore the knowledge of advanced engineering materials for various engineering applications.
CO5	Analyze fuel and suggest use of alternative fuels.
CO6	Familiarize with classification, properties and applications of nanomaterials.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Water Technology:** Introduction, Chemical Analysis of Water- Hardness; Temporary and Permanent, Alkalinity (Hydroxide, Carbonate and Bicarbonate), Softening Methods: Zeolite and Demineralization Process, Water Purification: Reverse Osmosis. Simple Numerical on Hardness Determination and Alkalinity Calculation.	05
2.	**Instrumental Methods of Analysis:** Types of analysis: Quantitative and Qualitative analysis Introduction, Instrumentation and Applications of following methods: Colorimetry, pHmetry (Titration of Strong acid versus Strong base), Conductometry (Titration of Strong acid versus Strong base)	05
3.	**Corrosion Science:** Introduction, Types of Corrosion-Dry and Wet corrosion, Wet Corrosion Mechanism: Hydrogen Evolution and Oxygen Absorption, Factors affecting rate of corrosion. Methods of prevention of corrosion: Cathodic Protection (Sacrificial Anode), Anodic Protection (Anodizing), Methods to apply Metallic Coatings-Hot dipping, Electroplating.	04

4.	**Engineering Polymers:** Polymers: Introduction, Definition of Polymer, Monomer and Functionality of monomers Speciality Polymers: Introduction, Preparation, Properties and Applications of the following polymers: 1. Engineering Thermoplastic: Polycarbonate 2. Conducting Polymer: Polyacetylene Polymer Composites: Introduction, Constituents of composite, Advantages over conventional materials, Applications, Fiber Reinforced Plastic (FRP)-Glass reinforced and Carbon reinforced.	04
5.	**Fuels and Combustion:** Introduction, Calorific value - Definition, Gross and Net calorific value, Determination of Calorific value: Principle, Construction and Working of Bomb Calorimeter (Simple Numerical), Solid fuel: Coal: Analysis of Coal-Proximate (Simple Numerical). Alternate fuels: Biodiesel and Power alcohol. Hydrogen as future fuel: Production, Advantages, Storage and Applications in Hydrogen fuel cell.	04
6.	**Nanomaterials:** Introduction, Classification of Nanomaterials Based on Dimensions, Nanoscale materials: Structure, Properties and Applications of Graphene and Quantum dots (semiconductor nanoparticles), Importance of Nanotechnology in engineering applications.	04
	TOTAL	**26**

Text Books:

1. O.G. Palanna," Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd.
2. Dara S. S., Umare S. A., "Textbook of Engineering Chemistry", 12th Ed, S. Chand & Com Ltd.
3. Jain and Jain, "Engineering Chemistry", 16th Ed, Dhanpat Rai and Co. (Pvt.) Ltd., Delhi.

Reference Books:

1. G. R. Chatwal& S. K. Anand, "Instrumental Methods of Chemical Analysis", Himalaya Publishing House.
2. Dr. Sunita Rattan; A Textbook of Engineering Chemistry; 3rd Ed, S. K. Kataria & Sons, New Delhi
3. V. R. Gowarikar, N. V. Viswanathan, Jayadev Sreedhar, "Polymer Science", Wiley Eastern Limited.
4. Billmeyer F. W., "Textbook of polymer science", John Wiley and Sons.
5. B. Sivasankar, "Engineering Chemistry", Tata Mcgraw-Hill Education Publishing company Limited.
6. G. L. Hornyak, J. J. Moone, H. F. Tihhale, J. Dutta "Fundamentals of Nanotechnology", CRC press.

E-Resources:

MOOC / NPTEL/YouTube Links:

1. NPTEL Course on Corrosion, IISc Banglore
   http://nptel.ac.in/courses/113108051/
2. NPTEL Course on Polymer, IIT Kharagpur
   http://nptel.ac.in/courses/104105039/,
   http://nptel.ac.in/courses/104103071/40
3. NPTEL Course on Water Technology, IIT Kanpur
   http://nptel.ac.in/courses/105104102/
4. NPTEL Course on UV-Visible Spectroscopy
   http://nptel.ac.in/courses/102103044/4
5. NPTEL Course on Energy Sources
   http://nptel.ac.in/courses/103105110/4
6. NPTEL Course on "Engineering Chemistry-I
   https://nptel.ac.in/courses/122/106/122106028/
7. NPTEL Course on "Fundamentals of Spectroscopy", NCL,IISER Pune
   https://nptel.ac.in/courses/104/106/104106122/

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Engineering Chemistry Lab								**Code:** 26CEBS204P	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	-	25	-	25

Prerequisites:

Basic knowledge of volumetric analysis, structure property relationship, classification and properties of polymers, electromagnetic radiation, electrochemical series.

Course Objectives:

1. To develop practical skills in quantitative chemical analysis of water samples for hardness and alkalinity.
2. To familiarize students with instrumental techniques such as pH metry, conductometry, and spectrophotometry.
3. To enable students to verify Beer's law and determine unknown concentrations using absorption spectroscopy.
4. To provide hands-on experience in the preparation of polymeric resins and determination of molecular weight of polymers.

Course Outcomes: After completion of this course, students will be able to -

CO1	Apply instrumental techniques such as pH metry, conductometry, and spectrophotometry to determine acid strength, verify Beer's law, and find unknown concentrations.
CO2	Demonstrate understanding of corrosion behaviour and nanoparticle synthesis through observation and analysis of demonstration experiments.

List of Experiments:

A. Lab Experiments (Any Seven)

1. Determination of hardness of water by EDTA method.
2. Determination of alkalinity of water.
3. Determination of strength of strong acid using pH meter.
4. Determination of maximum wavelength of absorption of CuSO4/FeSO4/KMnO4, verify Beer's law and find unknown concentration of given sample.
5. Titration of a mixture of strong acid with strong base using Conductometer.
6. Preparation of phenol-formaldehyde/urea-formaldehyde resin.
7. Proximate analysis of coal.
8. Coating of copper or zinc on iron plate using electroplating.
9. Determination of the molecular weight of a polymer by using Ostwald's Viscometer.

B. Demonstration (virtual) (Any One)

1. Demonstration of effect of environmental conditions on metal by weight loss method.
2. Synthesis of oxide nanoparticles.

Reference Books:

1. G. R. Chatwal& S. K. Anand, "Instrumental Methods of Chemical Analysis", Himalaya Publishing House.
2. Dr. Sunita Rattan; A Textbook of Engineering Chemistry; 3rd Ed, S. K. Kataria & Sons, New Delhi
3. V. R. Gowarikar, N. V. Viswanathan, Jayadev Sreedhar, "Polymer Science", Wiley Eastern Limited.
4. Billmeyer F. W., "Textbook of polymer science", John Wiley and Sons.
5. B. Sivasankar, "Engineering Chemistry", Tata Mcgraw-Hill Education Publishing company Limited.
6. G. L. Hornyak, J. J. Moone, H. F. Tihhale, J. Dutta "Fundamentals of Nanotechnology", CRC press.

E-Resources:

Virtual Labs:

1. PICT Pune
   http://chemistryvl.pict.edu/#/
2. NITK Surathkal: Hardness of water
   https://ee1-nitk.vlabs.ac.in/exp/determination-of-hardness/simulation.html#:
3. NITK Surathkal: Alkalinity of water
   https://ee1-nitk.vlabs.ac.in/exp/determination-of-alkalinity/ simulation.html
4. IIT Hyderabad: Colorimeter, verification of Beer's law
   https://mas-iiith.vlabs.ac.in/exp/beer-law/ simulation.html
5. IIT Kanpur: Preparation of phenol-formaldehyde resin
   http://ebootathon com/labs/beta/ chemistry/ EngineeringChemistryLab/exp1/simulation.html
6. Amrita University: Determination of viscosity average molecular weight polymer
   https://pcvau.vlabs.ac.in/physicalchemistry/Determination_of_ViscosityAverageMolecularWeightofPolymer/

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Engineering Mechanics								**Code:** 26CEES203	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	-	-	03	40	60	-	-	-	100

Prerequisites:

Fundamental grasp of physics, particularly mechanics, including concepts such as force, motion, and equilibrium, Proficiency in mathematics, especially algebra, trigonometry, and calculus, Understanding concepts related to forces, Stress strain etc., Familiarity with engineering principles and terminology, as well as basic knowledge of materials and their properties.

Course Objectives:

1. To develop students' ability to analyze the problems involving forces, moments with their applications.
2. To develop the student's ability to find out the center of gravity and moment of inertia and their applications.

Course Outcomes: After the completion of course, students will be able to

CO1	Compute the resultant of a force system and resolution of a force.
CO2	Comprehend the action for forces, moments, and other types of loads on rigid and analyze the frictional resistance offered by different planes.
CO3	Determine reactions of beams and calculate forces in trusses using principles of equilibrium.
CO4	Locate the centroid and compute the moment of inertia of sections.
CO5	Calculate position, velocity and acceleration of particle using principles of kinematics.
CO6	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Fundamentals of Force and Force Systems:** Fundamental Laws in mechanics, Force, System of Forces, Resolution and Composition of Forces, Resultant of coplanar force system, Moment, Varignon's Theorem, Law of Moments, Couple, Equivalent force couple system, Numerical examples.	07
2.	**Equilibrium of Bodies and Friction:** **Equilibrium of systems/bodies:** Conditions of Equilibrium, Lami's Theorem, Free Body Diagram Numerical examples. **Friction:** Laws of friction, application of friction on inclined planes, Wedges and ladders friction, belt friction, Numerical examples.	07

3.	**Analysis of Beams and Trusses:** **Beams:** Types of supports, Types of beams, Types of loads, Analysis of Simple and Compound beams, Determination of support reactions Numerical examples. **Introduction of Trusses**, Perfect Truss, Deficient Truss, Redundant Truss, Analysis of Statically determinate plane trusses by Method of Joints & Method of Section Numerical examples.	07
4.	**Centroid & Moment of Inertia:** **Centroid of Plane areas:** Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle, centroid of composite areas and simple built-up sections, Numerical examples. **Moment of inertia of plane areas:** Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas, moment of inertia of composite areas and simple built-up sections, Numerical examples	06
5.	**Kinematics:** Kinematics of linear motion- Basic concepts Equation of motion for constant acceleration Motion under gravity, Variable acceleration, Kinematics of curvilinear motion- Basic Concepts, Equation of motion in Cartesian coordinates, Motion of projectile. Numerical examples.	06
6.	**Kinetics of Particle:** Kinetics- Newton's Second Law of motion & its application. Work, power, energy, conservative and non-conservative forces Conservation of energy for motion of particle Numerical examples.	06
	TOTAL	**39**

Text Books:

1. F. P. Beer and E. R. Johnson, "Vector Mechanics for Engineers", McGraw-Hill Publication.
2. R. C. Hibbeler, "Engineering Mechanics", Pearson Education.
3. Bansal R. K., Rakesh Ranjan Beohar, and Ahmad Ali Khan, "Basic Civil Engineering and Engineering Mechanics", Laxmi Publications.
4. R.S. Khurmi, "Engineering Mechanics", S. Chand Publications.
5. P.G. Deshpande, "Applied Mechanics", Mahalaxmi Publication.
6. Bhavikatti S. S., "Engineering Mechanics", New Age International, 2019.

Reference Books:

1. S. P. Timoshenko and D. H. Young, "Engineering Mechanics", McGraw-Hill Publication.
2. J. L. Meriam and Craig, "Engineering Mechanics", John Wiley.
3. F. L. Singer, "Engineering Mechanics", Harper and Rowe Publication.
4. A. P. Boresi and R. J. Schmidt, "Engineering Mechanics", Brooks/Cole Publication.

DEPARTMENT OF CIVIL ENGINEERING

E-Resources:

1. A Video on "Introduction to Engineering Mechanics"-
   https://www.youtube.com/watch?v=ksmsp9OzAsI
2. A Video on "Newton's First law of motion" -
   https://www.youtube.com/watch?v=LEHR8YQNm_Q
3. A Video on "Newton's Second law of motion"
   https://www.youtube.com/watch?v=ZvPrn3aBQG8
4. A Video on "Newton's Third law of motion"
   https://www.youtube.com/watch?v=aKCQv4UpOfo
5. A Video on "Force system"
   https://www.youtube.com/watch?v=iy8l6vUm0iw
6. A Video on "Couple"
   https://www.youtube.com/watch?v=hy7Tg8UoaP4
7. A video on "Free Body Diagram (FBD)"
   https://www.youtube.com/watch?v=4Bwwq1munB0
8. NPTEL Video Lecture on "Friction, Types of friction & Laws of friction"
   https://t.ly/Lpe-q
9. NPTEL Video Lecture on "Types of supports, Beams & Loads acting on beam"
   https://shorturl.at/W3AId
10. A Video on "Truss & it's Types"
    https://www.youtube.com/watch?v=gd5bMFWtuHU
11. NPTEL Video Lecture on "Analysis of trusses by method of joints"
    https://t.ly/JMViq
12. NPTEL Video Lecture on "Analysis of trusses by method of section"
    https://t.ly/104Yr
13. A Video on "Centroid"
    https://www.youtube.com/watch?v=R8wKV0UQtlo
14. A Video on "Types of Motion"
    https://www.youtube.com/watch?v=8qh--3X6E5w

15. A Video on "Curvilinear Motion"
    https://www.youtube.com/watch?v=7J_Pi4Xuk7Y

16. A Video on "Motion Under Gravity"
    https://www.youtube.com/watch?v=9IIPl-eXBqs

17. NPTEL Video Lecture on "Projectile Motion"
    https://shorturl.at/c4Jt1

18. A Video on "Potential Energy & Kinetic Energy"
    https://www.youtube.com/watch?v=IqV5L66EP2E

19. A Video on "Work, Force & Energy"
    https://www.youtube.com/watch?v=WSY4HzWZIlo

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Engineering Mechanics Lab								**Code:** 26CEES203P	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	-	50	-	50

Prerequisites:

Fundamental grasp of physics, particularly mechanics, including concepts such as force, motion, and equilibrium, Proficiency in mathematics, especially algebra, trigonometry, and calculus, Understanding concepts related to forces, Stress strain etc, Familiarity with engineering principles and terminology, as well as basic knowledge of materials and their properties.

Course Objectives:

1. To develop students' practical understanding of fundamental principles of engineering mechanics through laboratory experiments and problem-solving activities.
2. To familiarize students with force systems, support reactions, friction, curvilinear motion, and impact-related phenomena through experimental investigations.

Course Outcomes: After the completion of course, students will be able to

CO1	Compute the resultant of a force system and resolution of a force.
CO2	Comprehend the action for forces, moments, and other types of loads on rigid and analyze the frictional resistance offered by different planes.
CO3	Determine reactions of beams and calculate forces in trusses using principles of equilibrium.

Course Contents:

List of Experiments:

1. Verification of law of parallelogram of forces
2. Verification of law of polygon of forces.
3. To determine the support reaction of simple beams.
4. To determine the support reaction of compound beams.
5. Determination of coefficient friction of belt/inclined plane.
6. To study the curvilinear motion.
7. Determination of coefficient of restitution.
8. Assignment of five problems on every unit to be solved during practical
9. A site visit to godown/ warehouse/ mobile tower/ suspension bridge having truss, cables and frames.

Reference Books:

1. S. P. Timoshenko and D. H. Young, "Engineering Mechanics", McGraw-Hill Publication.
2. J. L. Meriam and Craig, "Engineering Mechanics", John Wiley.
3. F. L. Singer, "Engineering Mechanics", Harper and Rowe Publication.
4. A. P. Boresi and R. J. Schmidt, "Engineering Mechanics", Brooks/Cole Publication.

DEPARTMENT OF CIVIL ENGINEERING

E-Resources:

1. A Video on "Introduction to Engineering Mechanics"- https://www.youtube.com/watch?v=ksmsp9OzAsI
2. A Video on "Newton's First law of motion" - https://www.youtube.com/watch?v=LEHR8YQNQ
3. A Video on "Newton's Second law of motion" https://www.youtube.com/watch?v=ZvPrn3aBG8
4. A Video on "Newton's Third law of motion" https://www.youtube.com/watch?v=aKCQv4Upfo
5. A Video on "Force system" https://www.youtube.com/watch?v=iy8l6vUm0iw
6. A Video on "Couple" https://www.youtube.com/watch?v=hy7Tg8UoaP4
7. A video on "Free Body Diagram (FBD)" https://www.youtube.com/watch?v=4Bwwq1munB0
8. NPTEL Video Lecture on "Friction, Types of friction & Laws of friction" https://t.ly/Lpe-q
9. NPTEL Video Lecture on "Types of supports, Beams & Loads acting on beam" https://shorturl.at/W3AId
10. A Video on "Truss & it's Types" https://www.youtube.com/watch?v=gd5bMFWtuHU
11. NPTEL Video Lecture on "Analysis of trusses by method of joints" https://t.ly/JMViq
12. NPTEL Video Lecture on "Analysis of trusses by method of section" https://t.ly/104Yr
13. A Video on "Centroid" https://www.youtube.com/watch?v=R8wKV0UQtlo

14. A Video on "Types of Motion"
    https://www.youtube.com/watch?v=8qh--3X6E5w

15. A Video on "Curvilinear Motion"
    https://www.youtube.com/watch?v=7J_Pi4Xuk7Y

16. A Video on "Motion Under Gravity"
    https://www.youtube.com/watch?v=9IIPl-eXBqs

17. NPTEL Video Lecture on "Projectile Motion"
    https://shorturl.at/c4Jt1

18. A Video on "Potential Energy & Kinetic Energy"
    https://www.youtube.com/watch?v=IqV5L66EP2E

19. A Video on "Work, Force & Energy"
    https://www.youtube.com/watch?v=WSY4HzWZIlo

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Engineering Science of Construction Materials								**Code:** 26CEES204	
Teaching Scheme (Hrs/Week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	-	-	02	40	60	-	-	-	100

Prerequisites:

Engineering Drawing, Building Materials & Construction, Basic Mathematics & Surveying

Course Objectives:

1. Introduce students to the properties, manufacturing, classification, testing, and applications of various conventional and eco-friendly building and finishing materials.
2. Familiarize students with civil engineering instrumentation, structural monitoring systems, sustainable construction practices, green buildings, and LEED certification.

Course Outcomes: On completion of the course, learner will be able to -

CO1	Analyze and decide suitable building materials cement, bricks, stone, aggregates, reinforcing steel, structural glazing, structural steel, PCC, RCC, PSC, RMC, eco- friendly materials.
CO2	Select suitable building bricks like standard, conventional, modular, manufacturing, Burnt clay, Fly ash, Engineering, Calcium silicate, Sundried, characteristics, properties & uses.
CO3	Demonstrate suitable building stones, requirements, quarrying, wedging, blasting, testing's, deterioration and preservation
CO4	Evaluate the quality, durability, defects, and performance of construction and finishing materials using relevant characteristics, tests, and standards.
CO5	Determine appropriate finishing materials such as plaster, varnishes, distempers, and modern construction materials based on functional, aesthetic, and sustainability requirements.
CO6	Explain various instruments in construction, water resources, Environmental, Foundation, Thermocouples, Half Cell Potentiometers, Strain Gauges, telemetry, SCADA, LEED.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Building Materials** Introduction to basic construction materials; cement, bricks, stone, aggregates, reinforcing steel, structural glazing, structural steel; Concrete types: PCC, RCC, Prestressed, Precast and Ready Mix Concrete. Use of various eco- friendly materials in construction.	05
2.	**Bricks** Composition of bricks, standard and conventional brick, modular bricks, manufacture of bricks, Burnt clay bricks, Fly ash bricks, Engineering bricks, Calcium silicate bricks, Sundried Bricks, Eco bricks, Classification of bricks as per IS code, characteristics of good bricks, Substitutes for bricks – Cement concrete blocks (solid), Production process of solid blocks. Fire clay/Refractory bricks, Calcium Silicate Bricks properties and uses.	05

3.	**Stones** Requirements of good building stone: Basic terminology, strength, durability, ease of dressing, appearance, mineral composition, textures and field structures, suitability of common rocks as building stone, quarrying of stones by wedging and blasting, tests on stone (Acid test, Attrition, crushing, impact and water absorption), characteristics of a good stone, deterioration and preservation of stones.	04
4.	**Timber, Ferrous, Non-Ferrous Metals and Binding Materials:** Timber, Ferrous and Non-Ferrous Metals, Binding Materials, Mortar and concrete	04
5.	**Finishing materials:** Plastering, Flooring Materials, Roofs and Roofing Materials Paints: Requirements of paints, Ingredients, Types, surfaces, wood surfaces, metal surfaces, defects in painting. Varnishes: Objective, characteristics of good varnish, ingredients. Distempers: Composition, properties. Miscellaneous Materials	04
6.	**Instrumentation in Civil Engineering Structures** Various Instruments used in construction, water resources, Environmental Engineering, Foundation Engineering, Thermocouples, condition monitoring equipment's, Half Cell Potentiometers, Strain Gauges. Management of Utilities using telemetry & SCADA System. **Sustainable Development:** Role of Engineers in Sustainable Development. Concept of green buildings and LEED Certification.	04
	TOTAL	**26**

Text Books:

1. R. B. Gupte, "Text Book of Engineering Geology", P.V.G. Publications, Pune, 2001.
2. N. Chenna Kesavulu, "Text Book of Engineering Geology", MacMillan India Ltd., 2010.
3. B.C. Punmia, "Building Construction", Laxmi Publications.
4. S. V. Deodhar, "Building Materials", Khanna Publication.

Reference Books:

1. D. Venkat Reddy, "Principles of Engineering Geology", Vikas Publishers, 2010.
2. Construction Planning, Equipments and Methods: Robert Peurifoy, Clifford J. Schexnayder, Aviad Shapira and Robert Schmitt.
3. F. G. Hbly and De Frietus, "Engineering Geology", Reed Elsevier India.
4. S. K. Duggal, "Building Materials", New Age International Publishers.
5. D.N. Ghose, "Materials of Construction", Tata McGraw Hill.
6. B. K. Agrawal, "Introduction to Engineering Materials", Tata McGraw Hill, New Delhi.
7. Bindra and Arora, "Building Construction", Dhanpat Rai Publications.
8. Ruth T. Brantley and L. Reed Brantley, "Building Materials Technology", Tata McGraw Hill.
9. S. K. Garg, "Physical and Engineering Geology", Khanna Publication.
10. Parbin Sing, "Engineering and General Geology", Katson Books.

DEPARTMENT OF CIVIL ENGINEERING

E-Resources:

1. Building Materials and Construction by Dr .B.Bhattacharjee, Department of Civil Engineering,IIT Delhi
   https://www.youtube.com/watch?v=EIDXE28_8eQ&list=PL8BA090E69BF01BC2

2. Building Materials and Composites, IIT Kharagpur
   https://nptel.ac.in/courses/124105013

3. Introduction to Urban Planning, IIT Roorkee
   https://nptel.ac.in/courses/124107158

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)							**Semester:** II		
Course: Concrete Technology							**Code:** 26CEPC201		
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	-	-	03	40	60	-	-	-	100

Prerequisites:

Basic understanding of materials science and engineering principles, Familiarity with construction practices and terminology, Knowledge of mathematics, particularly in calculations involving proportions and measurements, Awareness of safety protocols and procedures related to working with construction materials.

Course Objectives:

1. To know properties of various ingredients of concrete and concept of mix design.
2. To learn the behavior and properties of concrete in a fresh and hardened state.
3. To understand special concrete and their applications.
4. To understand the durability aspects and preventive measures to enhance the fife of concrete.

Course Outcomes: After the completion of course, students will be able to

CO1	Identify the ingredients of concrete and its suitable proportion to achieve desired results.
CO2	Compare the properties of concrete in fresh state.
CO3	Demonstrate the properties of concrete in a hardened state.
CO4	Design the concrete mix as per relevant codes.
CO5	Distinguish concreting equipments, techniques and types of special concrete.
CO6	Determine repairing methods and techniques after examining deteriorations in concrete.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Concrete Ingredients:** **A) Cement:** Cement manufacturing process, chemical composition and their importance, hydration of cement, types of cement. testing of cement (list and significance only), steps to reduce carbon footprint. **B) Fine aggregates:** Functions, requirements, alternatives to river sand, m-sand introduction, and manufacturing. **C) Coarse aggregates:** Importance of size, shape and texture. grading and blending of aggregates. properties and testing (list and significance only) of aggregates, recycled aggregates. **D) Water –** Requirements of water quality as per IS code. **E) Chemical admixtures –** Plasticizers, accelerators, retarders, and air entraining agents. **Mineral admixtures –** Pozzolanic and cementitious materials, fly ash, GGBS, silica fumes, metakaolin and rice husk ash.	07

2.	**Production and Properties of Fresh Concrete:** **A) Production of Fresh Concrete:** Nominal mixes, water-cement ratio, process of manufacturing fresh concrete-batching, mixing, transportation, compaction, curing of concrete, curing methods, influence of temperature, maturity rule. B) **Properties of Fresh Concrete:** Workability and factors affecting workability, consistency and setting time, bleeding, segregation, and laitance- causes and prevention, rheology of fresh concrete, temperature effects, effect of admixture on workability of concrete and optimum dosage of admixture using marsh cone test.	07
3.	**Properties of Hardened Concrete:** **A) Properties:** Factors affecting strength, micro-cracking and stress-strain relationship, relation between tensile and compressive strength, impact strength, abrasion resistance, creep and shrinkage. **B) Significance of Tests:** destructive tests: compression strength, flexural strength and tensile strength, pullout test, core test. nondestructive tests: rebound hammer, ultrasonic pulse velocity, and impact echo test, magnetic particle testing, liquid penetration testing, visual testing, laser testing methods, leak testing, carbonation test, half-cell potentiometer and corrosion of steel and relevant provisions of I.S. codes.	07
4.	**Mix Design of Concrete:** **A) Concrete Mix Design:** Characteristic strength concept and objectives of mix design, factors to be considered, statistical quality control, acceptance criteria for concrete as per IS specifications. quality control guidelines. **B) Methods of Mix Design:** IS code method (Numerical included on with and without mineral admixture).	06
5.	**Concreting Equipment, Techniques and Special concretes:** **A) Concreting Equipment:** Concrete mixers, pumps, vibrators and compaction equipment. **B) Special concreting techniques:** Pumped concrete, ready mix concrete, under water concreting, roller compacted concrete, cold and hot weather concreting, shotcrete concreting. **C) Special concrete:** Light weight concrete and its types, self-compacting concrete, high strength concrete, high performance concrete, reinforced cement concrete, prestressed and precast concrete, fiber reinforced concrete, geo-polymer concrete, vacuum concrete, ferrocement concrete.	06
6.	**Deterioration and Repairs in Concrete:** **A) Deterioration –**Durability and factors affecting durability, permeability, sulphate attack, acid attack, chloride attack, effect of sea water, carbonation of concrete, corrosion of reinforcement. **B) Repairs –** Evaluation of cracks and diagnosis of concrete, repair of defects using various types and techniques, shotcrete and grouting. Introduction to retrofitting of concrete, corrosion monitoring.	06
	TOTAL	**39**

Text Books:

1. M. S. Shetty, "Concrete Technology", S Chand, New Delhi-110055.
2. M. L. Gambhir, "Concrete Technology", Tata McGraw-Hill.
3. A. M. Neville and J.J. Brooks, "Concrete Technology", Pearson.

Reference Books:

1. A. R. Shantakumar, "Concrete Technology", Oxford University Press, 2018.
2. A. M. Neville, "Properties of Concrete", Longman Publishers.
3. R.S. Varshney, "Concrete Technology", Oxford and IBH.
4. P. Kumar Mehta, "Microstructure and Properties of Concrete", Prentice Hall.
5. A. P. Remideos, "Concrete Mix Design", Himalaya Publishing House.
6. J. Bhattacharjee, "Concrete Structures, Repair, Rehabilitation and Retrofitting", CBS Publishers & Distributors Pvt. Ltd.
7. A. Sarja and E. Vesiari, "Durability Design of Concrete Structures", E & FN Spon Publication.

IS Codes:

Latest revised editions of IS codes: IS 456, IS 269, IS 1489, IS 4031, IS 383, IS 2386, IS 9103, IS 516, IS 1199, IS 10262

E-Resources:

1. Cement
   https://nptel.ac.in/courses/105102012/1
2. Aggregates
   https://nptel.ac.in/courses/105102012/6
3. Mineral admixtures
   https://nptel.ac.in/courses/105102012/11
4. Chemical admixtures
   https://nptel.ac.in/courses/105102012/9,
   https://nptel.ac.in/courses/105102012/10
5. Concrete mix design
   https://nptel.ac.in/courses/105102012/14
6. Concrete production & fresh concrete
   https://nptel.ac.in/courses/105102012/19
7. Engineering properties of concrete
   https://nptel.ac.in/courses/105102012/23
8. Dimensional stability & durability
   https://nptel.ac.in/courses/105102012/27
9. Durability of concrete
   https://nptel.ac.in/courses/105102012/31
10. Special concretes
    https://nptel.ac.in/courses/105102012/36

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Professional Practices in Concrete Testing								**Code:** 26CEVS202	
Teaching Scheme (Hrs/Week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	04	-	02	-	-	25	-	-	25

Prerequisites:

Foundational Knowledge of Materials Science, Familiarity with Laboratory Techniques, Understanding of Concrete Technology, Awareness and knowledge of relevant standards and I S Codes.

Course Objectives:

1. To develop students' practical skills in testing cement, aggregates, fresh concrete, hardened concrete, and self-compacting concrete as per relevant standards.
2. To familiarize students with concrete mix design, quality assessment, strength evaluation, durability, and fatigue behavior through laboratory and field investigations.

Course Outcomes: After completion of this course, students will able to-

CO1	Select appropriate standard tests and procedures to determine the physical and mechanical properties of cement, aggregates, and concrete.
CO2	Analyze the workability, strength, durability-related properties, and performance of conventional and self-compacting concrete using experimental data.
CO3	Evaluate concrete mix designs and field practices by interpreting test results, applying relevant IS code provisions, and preparing technical reports.

Course Contents:

List of Experiments: (Any 10)

1. Testing of cement: Consistency, Fineness and Setting time.
2. Testing of cement: Specific Gravity, Soundness and Strength of cement.
3. Testing of fine aggregate: Specific Gravity, Sieve analysis and zoning,
4. Testing of fine aggregate: Bulking of fine aggregate, Bulk density and silt content.
5. Testing of coarse aggregate: Specific Gravity, Sieve analysis and Bulk density.
6. Testing of coarse aggregate: Flakiness index, elongation index, Water absorption & moisture content.
7. Workability of concrete by Slump cone, Compaction factor and/or Vee Bee test.
8. Tests on self-compacting concrete- Mix design of self-compacting concrete, Slump flow test, V-funnel test, J-Ring test, U Box test and L Box test
9. Determination of Compressive strength test of concrete by Crushing and Rebound hammer/ ultrasonic pulse velocity.
10. Determination of indirect tensile strength and Flexural strength of hardened concrete.
11. Fatigue test on concrete.
12. Concrete mix design by IS code method manually and using spreadsheet (Assignment).
13. Site visit and Report writing of RMC plant or precast concrete plant.
14. Assignment on each unit covering those tests which are not included in compulsory experiments.

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Reference Books:

1. M. L. Gambir, "Concrete Manual", Dhanpatrai and sons, New Delhi.
2. Mehta P.K, "Properties of Concrete", Tata McGraw Hill Publications, New Delhi.
3. Neville AM, "Properties of Concrete", ELBS Publications, London.
4. M. S. Shetty, "Concrete Technology", S Chand, New Delhi-110055.
5. M. L. Gambhir, "Concrete Technology", Tata McGraw-Hill.
6. A. M. Neville, "Concrete technology", J.J. Brooks, Pearson.

E-Resources:

1. Cement testing
   https://www.youtube.com/watch?v=sl0smPfvVAo&authuser=0
   https://www.youtube.com/watch?v=EJVSxsCin3E&authuser=0
   https://www.youtube.com/watch?v=vP2NFJk2G0w&authuser=0
   https://www.youtube.com/watch?v=EIHBX-dBjYg&authuser=0

2. Sand testing
   https://www.youtube.com/watch?v=7nhp3vmi860&authuser=0
   https://www.youtube.com/watch?v=l6vk0EM4yPg&authuser=0
   https://www.youtube.com/watch?v=qz0-nF_2hH8&authuser=0
   https://www.youtube.com/watch?v=kCpG3_nbL0Y&authuser=0
   https://www.youtube.com/watch?v=Fz1PCixlSiI&authuser=0
   https://www.youtube.com/watch?v=MuhpE0Sk4EI&authuser=0

3. Aggregate testing
   https://www.youtube.com/watch?v=hqXFPq676iM&authuser=0
   https://www.youtube.com/watch?v=F_xuEo3scwQ&authuser=0
   https://www.youtube.com/watch?v=acfJIG9o8iw&authuser=0
   https://www.youtube.com/watch?v=Mn7aeorMpTs&authuser=0
   https://www.youtube.com/watch?v=lE7LFOuGKyI&authuser=0

4. Fresh concrete testing
   https://www.youtube.com/watch?v=ERnKVQcOfJU&authuser=0

5. Fresh concrete testing
   https://www.youtube.com/watch?v=VVDhq-bdeUE&authuser=0

6. Hard concrete testing
   https://www.youtube.com/watch?v=e8bH26-3PCw

7. Virtual lab
   https://cs-iitd.vlabs.ac.in/List%20of%20experiments.html

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Professional Development - II								**Code:** 26CECC203	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
01	02	-	02	-	-	25	-	-	25

Course Objectives:

1. To introduce students on employability skills and its importance in building career and professional life.
2. To inculcate prime and significant soft skills like presentation skills, communication skills etc required in today's professional environment.
3. To make students aware of employability skills like correspondence at work, team work and workplace etiquette to imbibe better employability maturity

Course Outcomes: After completion of this course, students will be able to -

CO1	Aware of change management from academic environment to corporate and industrial environment for an effective start in career, personal life, at workplace, society and professional world.
CO2	Understand the importance of necessity of prime soft skills like employability skills, presentation skills and communication skills required in today's professional workplace environment.
CO3	To be aware of significance of Special skills to excel at workplace and tapping team leader opportunities at engineering and technological organizations with finest work etiquette demonstration as a ladder for better growth and leadership perspective.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Employability Skills** Preparing for employment- transition from education to employment, selection process understanding, modern cv styles based on sector of employment, core and technical skills formulation and authentication, group discuss strategies and guidelines, Stages of interview- aptitude, technical, GD and personal interview	13
2.	**Prime skills at work place** Employability skills, raising your employability quotient, researching own perspective at workplace communication and organization culture, communication and interpersonal relations, significance of presentation skills in corporate world, overcoming fear of public speaking, correspondence at work	13
3.	**Special skills to excel at workplace** Work correspondence: Importance and types of work correspondence, seven Cs of communication, mechanics of effective business correspondence Teamwork: understanding team behaviors, teamwork as employability skill, significance of team spirit Workplace Etiquette: Etiquette in the modern workplace, Etiquette -global and local, gender sensitivity, Etiquette in interaction, Netiquette, non-office hours and party times business meets do and do nots, character building and careful identity creation in the organization.	13
	TOTAL	**39**

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Text Books:

1. M. K. Sinha, "Success Through Self-Discipline: Your Personal Guide to Achieving Your Goals"
2. Sabina Pillai, Agna Fernandez," Soft Skills and Employability Skills" Cambridge Press
3. Sanjay Kumar & Pushpa Latta, commination skills "Oxford higher education
4. Minakshi Raman & Sangita Sharma, "Technical Communication and Principal & Practices Oxfords Press.

Reference Books:

1. Stephen R. Covey, "The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change", Simon & Schuster, 1989.
2. Jack Canfield, "The Success Principles", HarperCollins, 2005.
3. Norman Vincent Peale, "The Power of Positive Thinking", Prentice Hall, 1952.

E-Resources:

1. Coursera: "The Science of Well-Being" by Yale University, - https://www.coursera.org/learn/the-science-of-well-being

2. Udemy: "Self-Care: Take Care ofYourselfto Better Take Care of Others" by Jessica Rogers https://www.udemy.com/course/caring-self/?couponCode=UPGRADE02223

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Guitar)								**Code:** 26CECC204A	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Basic knowledge of Indian classical music and Guitar musical instrument.

Course Objectives:

1. To enhance guitar skills through intermediate fingerpicking, lead techniques, and genre exploration, culminating in a polished final performance.

Course Outcomes: After completion of this course, students will be able to -

CO1	Execute intermediate fingerpicking techniques with precision and rhythm.
CO2	Apply advanced lead guitar techniques and pentatonic scales effectively.
CO3	Perform confidently across various genres including blues, rock, folk, and classical.
CO4	Deliver a polished final performance through focused practice and preparation.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Rhythm and Timing.	02
2.	Time Signatures.	02
3.	Understanding Basic Rhythms.	02
4.	Circle of Fifths.	02
5.	Introduction to Minor Scales.	02
6.	Advanced Chord Shapes.	02
7.	Introduction to Lead Techniques.	02
8.	Introduction to Pentatonic Scale.	02
9.	Practice and Review.	02
10.	Exploring Different Genres.	02
11.	Final Project Planning.	02
12.	Intensive Practice.	02
13.	Pre-Performance Preparation.	
14.	Final Performance.	02
	TOTAL	**28**

Text Books:

1. David Hodge, "Guitar Theory", DK Publishing.

Reference Books:

1. Russ Shipton, "The Complete Guitar Player", Published by Wise.
2. Vincent Ong, Alfred Khp," Classical Guitar Advanced Studies Repertoires", Dynamic Publication.

E-Resources:

1. https://www.youtube.com/watch?v=BBz-Jyr23M4

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Singing)								**Code:** 26CECC204B	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Basic knowledge of Indian classical music in singing.

Course Objectives:

1. To develop advanced singing techniques and ear training through Indian classical music, focusing on repertoire selection, effective rehearsal, and performance presentation.

Course Outcomes: After completion of this course, students will be able to -

CO1	Master legato, staccato, and advanced vocal methods in Indian classical music.
CO2	Improve musical ear through rigorous training and diverse classical repertoire.
CO3	Apply effective rehearsal strategies to prepare and present a polished performance.
CO4	Deliver a well-executed performance of selected Indian classical pieces with artistic expression

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Vibrato and Ornamentation.	02
2.	Range Extension.	02
3.	Legato and Staccato.	02
4.	Advanced Ear Training.	02
5.	Basics of Indian Semi Classical Music.	02
6.	Improvisation Techniques.	02
7.	Selecting Repertoire for Performance.	02
8.	Rehearsal Techniques.	02
9.	Dress Rehearsal.	02
10.	Final Performance.	02
11.	Performance Review.	02
12.	Exploring New Repertoire.	02
13.	Advanced Techniques and Styles.	2
14.	Course Recap and Future Directions.	2
	TOTAL	**28**

Text Books:

1. Dr. Theodore Dimon, "Anatomy of the Voice, This Is a Voice".

Reference Books:

1. Richard Miller, "The Structure of Singing", Schirmer Books, London.
2. Jennifer Hamady, "The Art of Singing", Published by Hal Leonard.

E-Resources:

1. https://www.youtube.com/watch?v=4hNq9qykOyE
2. https://www.youtube.com/watch?v=b14gkmECz-Y

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)									**Semester:** II
Course: Liberal Learning – II (Cinematography)									**Code:** 26CECC204C
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

A basic understanding of film theory, Camera operation, Lighting techniques and visual storytelling is essential for cinematography.

Course Objectives:

1. To master videography by learning camera techniques, shooting methods, and editing, culminating in a final project showcasing advanced skills in video production.

Course Outcomes: After completion of this course, students will be able to -

CO1	Operate camera components and techniques for steady, sharp video shooting.
CO2	Apply rule of thirds, framing, and stabilization methods effectively.
CO3	Use advanced editing tools and sound design for polished video projects.
CO4	Deliver a comprehensive final video project demonstrating learned skills.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Introduction to Videography	02
2.	Understanding camera components (lens, sensor, viewfinder)	02
3.	Techniques for steady shooting (tripods, handheld, gimbals)	02
4.	Understanding the rule of thirds, leading lines, and framing in video	02
5.	In-depth explanation of the exposure triangle: aperture, shutter speed, and ISO	02
6.	Importance of audio in videography	02
7.	Techniques for achieving sharp focus	02
8.	Motion and Stabilization	02
9.	Storyboarding and Planning	02
10.	Filming Techniques	02
11.	Introduction to Video Editing	02
12.	Introduction to advanced editing tools (color correction, audio editing, effects)	02
13.	Sound Design and Mixing	2
14.	Final Project Presentation and Review	2
	TOTAL	**28**

Text Books:

1. Tania Hoser, "Introduction to Cinematography", Taylor & Francis.

Reference Books:

1. Anat Pick, "Screening Nature", Berghahn Books.
2. Blain Brown, "Cinematography: Theory and Practice", Taylor & Francis.

E-Resources:

1. https://youtu.be/V7z7BAZdt2M?si=to4yQ46zEKRbxKOm
2. https://youtu.be/WXdAX0No2hM?si=GZu_mJsmyJ7NGnAU

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Dance)								**Code:** 26CECC204D	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Good stamina, flexibility and familiarity with simple rhythmic patterns and beats.

Course Objectives:

1. To develop advanced dance techniques, expressive skills, and performance readiness in Indian classical dance, culminating in a final performance.

Course Outcomes: After completion of this course, students will be able to -

CO1	Develop advanced techniques in footwork, postures, and hand gestures, with a focus on fluidity and expression.
CO2	Embody various characters and emotions through in-depth exploration of Abhinaya (expressional dance).
CO3	Execute learned dance pieces with precision, synchronization, and advanced rhythmic variations.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Introduction to Character Portrayal.	02
2.	Rehearsal and Feedback.	02
3.	Advanced Footwork and Postures.	02
4.	Advanced Hand Gestures and Movements.	02
5.	Rhythmic Variations and Combinations.	02
6.	Rehearsal of Dance Piece.	02
7.	Performance Techniques.	02
8.	Integrating Steps and Expressions.	02
9.	Full Dress Rehearsal.	02
10.	Improvisation and Creative Movement.	02
11.	Corrections and Adjustments.	02
12.	Mini Performance.	02
13.	Introduction to Abhinaya in Depth.	2
14.	Preparing a New Short Dance Item.	2
	TOTAL	**28**

Text Books:

1. Kapila Vatsyayan, "Indian Classical Dance", Publications Division Ministry of Information & Broadcasting.

Reference Books:

1. Shubhada Varadkar, "The Glimpse of Indian Classical Dance", Krimiga Books, Krimiga Content Development Pvt. Ltd.

E-Resources:

1. https://youtu.be/VP2jLLk8_jA?si=zg6_muy1w7jE5mbi
2. https://youtu.be/xZEP4XupwJA?si=YBt3RmcHxCRc2JSr

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Synthesizer/Keyboard)								**Code:** 26CECC204E	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Basic knowledge of Indian classical music and Keyboard musical instrument.

Course Objectives:

1. To develop advanced musical skills through complex progressions, improvisation, and composition, culminating in a polished performance and mastery of selected repertoire.

Course Outcomes: After completion of this course, students will be able to -

CO1	Apply complex chord progressions and advanced scales effectively in performance.
CO2	Demonstrate proficiency in improvisation and advanced chord voicings.
CO3	Perform selected repertoire with refined technique and stage presence.
CO4	Successfully showcase learned skills through a polished recital or performance.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	Introduction to more complex progressions (e.g., ii-V-I)	02
2.	Basics of improvisation	02
3.	Learning advanced scales (e.g., blues scale, pentatonic scale)	02
4.	Learning advanced chord voicings and inversions	02
5.	Advanced Arpeggios and Runs	02
6.	Basics of composing music	02
7.	Initial practice on selected repertoire	02
8.	Focused practice on repertoire pieces	02
9.	Understanding stage presence and performance techniques	02
10.	Final adjustments and practice on repertoire	02
11.	Attending or reviewing a masterclass	02
12.	Receiving personalized feedback on playing	02
13.	Dress rehearsal for recital or performance	02
14.	Showcasing learned skills and pieces	02
	TOTAL	**28**

Text Books:

1. Chuan C. Chang, Fundamentals of Piano Practice, Createspace Independent Publishing Platform

Reference Books:

1. Michael Rodman, "Keyboard for the Absolute Beginners", Alfred Publishing.
2. Davis Dorrough, "Piano Scales".

E-Resources:

1. https://youtu.be/2mPS-2guHVo?si=8X_4KKezIdrMejLH
2. https://youtu.be/tEtukfFv3Wk?si=2iJ8wdD0dfjWauPb

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Basketball)								**Code:** 26CECC204F	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To master advanced basketball skills, strategies, and mental conditioning to excel in team play, complex scenarios, and tournament preparation.

Course Outcomes: After completion of this course, students will be able to -

CO1	Demonstrate mastery of advanced dribbling, passing, shooting, and defensive techniques.
CO2	Apply complex defensive systems, advanced team play, and game strategies in mixed scenarios.
CO3	Develop the mental toughness, conditioning, and strategic insights needed for successful tournament performance

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Revision Of Fundamentals:** Review all Semester I skills. Recall and perform basic techniques correctly.	02
2.	**Body Technique & Footwork:** Learn pivoting, stopping and changing direction. Perform basic basketball footwork correctly.	02
3.	**Combined Skill Practice:** Combine passing, dribbling and shooting drills. Integrate fundamental basketball skills.	02
4.	**Player Stance & Ball Control:** Improve balance and ball protection. Maintain proper stance during play	02
5.	**Passing & Receiving Drills:** Practice passing with movement. Improve passing accuracy and coordination.	02
6.	**Dribble Control:** Develop speed and control while dribbling. Demonstrate improved dribbling ability.	02
7.	**Assessment – III**	02
8.	**Shooting Practice:** Practice set shots and lay-ups repeatedly. Improve shooting consistency.	02
9.	**Rebounding Practice:** Apply rebounding techniques in drills. Secure rebounds with correct positioning.	02
10.	**Individual Defence Practice:** Practice one-on-one defensive drills. Defend an opponent using proper stance.	02
11.	**Footwork Drills:** Improve pivoting and movement efficiency. Demonstrate better balance and coordination.	02
12.	**Combined Passing & Dribbling:** Perform passing after dribbling. Coordinate ball handling with passing.	02

13.	**Combined Shooting Drill:** Shoot after dribbling and passing. Apply shooting in simple game situations.	02
14.	**Assessment - IV**	02
	TOTAL	**28**

Text Books:

1. K.K. Sharma, "Basketball: Skills and Drills", Sports Publications

Reference Books:

1. Dr. P.K. Kher, "Basketball Coaching: A Complete Guide", Khel Prakashan
2. S. Reddy, "The Ultimate Guide to Basketball Training", Blue Rose Publisher

E-Resources:

1. Introduction to Exercise Physiology & Sports Performance, IIT Madras, https://nptel.ac.in/courses/109106406

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Cricket)								**Code:** 26CECC204G	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop advanced cricket skills and strategies in batting, bowling, and fielding, with a focus on mental conditioning, tactical execution, and competitive performance through intensive practice and match simulations.

Course Outcomes: After completion of this course, students will be able to -

CO1	Demonstrate advanced techniques in batting, bowling, and fielding, including targeted drills and intensive practice.
CO2	Apply batting and bowling strategies, and execute tactical plans during match simulations and competitive play.
CO3	Develop strong mental conditioning and teamwork skills, preparing for high-performance in competitive matches and final assessments.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Advanced Batting Footwork:** Improve movement against pace and spin	02
2.	**Stroke Production:** Cover drive, straight drive, sweep, lofted shots	02
3.	**Batting Against Spin:** Reading length and line	02
4.	**Advanced Fast Bowling:** Yorkers, bouncers, slower balls	02
5.	**Advanced Spin Bowling:** Flight, drift, turn, variations	02
6.	**Fielding Techniques:** Slip catching, close-in catching	02
7.	**Assessment - III**	02
8.	**Advanced Wicket Keeping:** Standing up to spinners, stumping's	02
9.	**Running Between Wickets:** Calling, turning, decision-making	02
10.	**Team Communication:** On-field coordination	02
11.	**Fitness For Cricket:** Agility, endurance, speed	02
12.	**Match Simulation:** Game scenarios	02
13.	**Practical & Theory Assessment:** Evaluate semester ii competencies	02
14.	**Assessment - IV**	02
	TOTAL	**28**

Text Books:

1. Sanjay Manjrekar, "Cricket Fundamentals", Orient Black Swan.
2. Ravi Shastri, "Winning Cricket: Skills and Strategies", Notion Press.

Reference Books:

1. Sachin Tendulkar, "Playing It My Way", Hachette India
2. Rahul Dravid, "Cricket: The Game of Life", Penguin India

E-Resources:

1. Sports and Performance Nutrition, IIT Madras, https://onlinecourses.nptel.ac.in/noc24_hs82/preview

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Rifle and Pistol Shooting)								**Code:** 26CECC204H	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To achieve advanced proficiency in rifle shooting through specialized training, technical refinement, and mental preparation for competitive performance.

Course Outcomes: After completion of this course, students will be able to -

CO1	Master advanced rifle shooting techniques and positions to achieve higher scores.
CO2	Develop strong mental preparation and focus techniques for peak performance and overcoming technical hurdles.
CO3	Gain specialized training and match practice, preparing them for ISSF events and advanced shooting challenges.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Dry Fire Practice**	2
2.	**Live Fire Introduction:** 1st attempt of live firing	2
3.	**Shot Grouping Practice:** Grouping and its process	2
4.	**Common Shooting Errors and Corrections**	2
5.	**Target Analysis:** How to analyse fired target	2
6.	**Zeroing:** Body zero and its importance	2
7.	**Assessment - III**	2
8.	**Standing Position Practice:** To take a proper body position and balancing the body weight properly.	2
9.	**Sitting Position Practice:** Focusing on triggering and making close grouping	2
10.	**Position Transition Drills:** Knowledge about correct position and its steps	2
11.	**Accuracy Improvement Drills**	2
12.	**Speed and Precision Shooting:** To do the process in given time and releasing the shot in correct timing	2
13.	**Trigger Reset Techniques:** Triggering steps	2
14.	**Assessment - IV**	2
	TOTAL	**28**

Reference Books:

1. David Watson, "ABCs of Rifle Shooting", Gun Digest (Imprint of KP Books), 2014.

E-Resources:

1. Introduction to Exercise Physiology & Sports Performance, IIT Madras, https://nptel.ac.in/courses/109106406

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Volleyball)								**Code:** 26CECC204I	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To achieve advanced proficiency in volleyball by mastering complex techniques, strategic systems, and mental conditioning, while preparing for competitive play and tournament scenarios.

Course Outcomes: After completion of this course, students will be able to -

CO1	Demonstrate expertise in advanced serving, spiking, setting, and blocking techniques tailored to specific positions.
CO2	Implement complex offensive and defensive systems and adapt to mixed scenarios through situational drills and gameplay.
CO3	

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Timing and Approach:** Introduction to spiking approach, 2-step and 3-step approach, arm swing coordination, jump timing, take-off mechanics, balance, and practice drills**.**	02
2.	**Straight Smash:** Fundamentals of straight spike, correct hand contact, body positioning, jump and arm action, landing technique, target practice, and error correction**.**	02
3.	**Basic Blocking:** Ready position for blocking, footwork along the net, hand positioning, timing of the jump, blocking against different attacks, and safety precautions**.**	02
4.	**Single Blocking Technique:** Individual blocking skills, reading the attacker's movement, timing the block, penetration over the net, recovery after blocking, and practice drills**.**	02
5.	**Rolling and Diving:** Techniques of forward roll, side roll, and dive, safe landing methods, defensive recovery, floor movement drills, and injury prevention**.**	02
6.	**Court Positioning:** Player positions (1–6), offensive and defensive court coverage, movement according to ball direction, transition from attack to defence, and positional awareness.	02
7.	**Assessment - III**	02
8.	**Rotation System:** Volleyball rotation rules, clockwise rotation, serving order, positional faults, rotational movement, and practical game application**.**	02
9.	**Team Communication:** Communication signals, calling the ball, leadership on court, teamwork, coordination during rallies, and effective communication exercises.	02
10.	**Basic Offensive System (4-2):** Introduction to the 4–2 offensive formation, setter responsibilities, hitter positioning, attack combinations, player movement, and	02

	tactical execution**.**	
11.	**Defensive Positioning:** Defensive formations, court coverage, reading opponents' attacks, blocking-defense coordination, and transition from defense to offense**.**	02
12.	**Mini Game (3 Vs 3):** Modified volleyball games emphasizing teamwork, communication, rotation, offensive and defensive skills, and decision-making in small-sided play**.**	02
13.	**Match Practice:** Full-game practice following official volleyball rules, application of learned skills and tactics, referee signals, scoring system, teamwork, and sportsmanship**.**	02
14.	**Assessment - IV**	02
	TOTAL	**28**
Text Books:		
1. Jitendra Kumar, "The Complete Guide to Volleyball", Blue Rose Publisher.		
Reference Books:		
1. N. Ramachandran, "Volleyball: Steps to Success", Sports Publication.		
E-Resources:		
1. https://coachtube.com/course/volleyball/volleyball-for-beginners/7004		

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: Liberal Learning – II (Football)								**Code:** 26CECC204J	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To enhance players' technical skills, tactical understanding, physical fitness, teamwork, and sportsmanship, fostering a comprehensive understanding and appreciation of the game.

Course Outcomes: After completion of this course, students will be able to -

CO1	Explain key concepts of transition play, positional drills, and the importance of endurance and stamina in football.
CO2	Apply advanced tactics during simulation matches, analyze high-pressure situations.
CO3	Students will design a game week routine that covers match preparation, mental and physical readiness, and post-match analysis, evaluating its impact on team performance and skills.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Shooting Techniques**: Demonstrate effective shooting techniques with proper body position, accuracy, power, and placement to create goal-scoring opportunities.	02
2.	**Finishing in Front of Goal:** Develop the ability to finish scoring opportunities in front of goal using accurate technique, quick decision-making, and composure under pressure.	02
3.	**Crossing Techniques:** Demonstrate effective crossing techniques with proper accuracy, timing, and delivery to create goal-scoring opportunities for teammates.	02
4.	**Tackling Techniques:** Demonstrate safe and effective tackling techniques using proper timing, body positioning, and decision-making to regain possession.	02
5.	**Defensive Skills:** Develop effective defensive skills through proper positioning, marking, interception, and teamwork to prevent attacking opportunities.	02
6.	**Goalkeeping Basics:** Demonstrate basic goalkeeping techniques including positioning, handling, diving, and distribution to effectively protect the goal.	02
7.	**Assessment - III**	02
8.	**Throw-ins**: Demonstrate correct throw-in techniques using proper body position, foot placement, and ball delivery to restart play effectively.	02
9.	**Free Kicks & Penalty Kicks:** Demonstrate proper techniques for taking free kicks and penalty kicks with accuracy, power, and decision-making to create scoring opportunities.	02
10.	**Running with the Ball:** Develop the ability to run with the ball using speed, control, and awareness to advance play and beat opponents effectively.	02
11.	**Communication on the Field:** Develop effective on-field communication skills through clear instructions, teamwork, and coordination to improve team performance.	02

12.	**Conditioning Drills:** Improve football-specific fitness through conditioning drills that develop endurance, speed, agility, strength, and overall match readiness.	02
13.	**Practice Match:** Apply technical skills, tactical understanding, teamwork, and decision-making effectively in a practice match situation.	02
14.	**Assessment - IV**	02
	TOTAL	**28**
Text Books:		
1. Srinivasan J. B, "Football Coaching: A Comprehensive Guide", Sports Publishing.		
Reference Books:		
1. Rob Ellis, "The Complete Guide to Coaching Soccer", Meyer & Meyer Sport.		
E-Resources:		
1. Udemy – Soccer Courses https://www.udemy.com/topic/soccer/		

DEPARTMENT OF CIVIL ENGINEERING

Program: B. Tech. (Civil Engineering)								**Semester:** II	
Course: IT Proficiency								**Code:** 26CEAE201	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
01	02	-	02	-	-	50	-	-	50

Prerequisites:

Basic Computer Skills

Course Objectives:

1. To develop proficiency in essential office software and tools, including MS Word, MS Excel, MS PowerPoint, and LaTeX, to create, analyze, and present professional documents and data effectively, while understanding ethical internet use and leveraging AI tools.

Course Outcomes: After completion of this course, students will be able to -

CO1	Create and format professional documents using MS Word.
CO2	Organize and analyze data using Excel's features.
CO3	Apply advanced Excel functions, pivot tables, charts, and macros to analyze and secure data.
CO4	Create effective presentations using MS PowerPoint features.
CO5	Create Professional Documents Using LaTeX.
CO6	Apply ethical practices in using internet resources and AI tools.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Basics of Computer and MS Word:** Awareness of computer Basics **MS-Word:** Text Basics, Text Formatting and saving file, Working with objects, Header &footers, Working with bullets and numbered lists, Tables, Styles and Content, Merging documents, Sharing and maintaining document, Proofing the document, Printing.	02
2.	**MS-Excel:** Introduction to Excel, Formatting excel work book, Perform calculations with functions, Sort and Filter data with Excel, Create effective 2D and 3D charts to Present data visually.	02
3.	**Advance MS-Excel**: Analyze data using pivot tables and pivot charts, Protecting and sharing the work book, Use Macros to automate tasks, Proofing and Printing, More useful functions in excel, Goal seek and scenario features, V-lookup and H-lookup functions, Advanced sort and filter in excel.	02
4.	**MS-PowerPoint**: Setting up PowerPoint environment, Creating slides and applying themes, Working with bullets and numbering, Working with objects, Hyperlinks and action buttons, Working with movies and sounds, Using SmartArt and Tables, Animation and slide transition, Using slide master, Slide show option, Proofing and Printing.	02
5.	**Introduction to Latex:** Installation of the software LaTeX , Understanding Latex compilation, Basic Syntax, Writing equations, Matrix, Tables. **Page Layout** – Titles, Abstract Chapters, Sections, References, Equation references, citation. List making environments, Table of contents, Generating new commands, Figure handling, Numbering, List of figures, List of tables, Generating index. **Packages** - Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tilez listing. Classes: article, book, report, beamer, slides. IEEtran. **Applications** - Writing Resume, Writing articles/ research papers, project report.	03

6.	**Internet Ethics & AI tools** Working with Internet and-mail, Using the Internet, Internet Ethics and Safety, Social Media, **AI Tools:** Jasper, GitHub Copilot, Synthesia, Writesonic.	02
	TOTAL	**13**

List of Experiments:

1. Create a collaborative document project where multiple users contribute to a document using MS Word's track changes and commenting features.
2. To analyze and visualize data effectively using Excel's functions and charts, aiming to create insightful and dynamic data visualizations.
3. Develop a financial modeling project using Excel, incorporating advanced functions like goal seek, scenario analysis, and pivot tables. Build automation using macros for repetitive tasks.
4. Create an interactive multimedia presentation on a complex topic of interest. Incorporate animations, transitions, embedded videos, and interactive elements like hyperlinks and action buttons.
5. Design and implement a digital marketing campaign for a fictitious product or service. Create email newsletters, social media posts, and analyze campaign performance metrics.
6. Prepare research article using Latex.

Text Books:

1. Banerjee Snigdha, "MS Word 2000", New Age International.
2. Quentin Docter, Q., et al., "CompTIA IT Fundamentals Study Guide: Exam FC0-U61", Wiley, USA.
3. Lambert, J., Frye, C., et al., "Microsoft Office 2019 Step by Step", Microsoft Press, USA.

Reference Books:

1. Walkenbach John, "Excel 2013 Bible", Wiley Publishing House.
2. Wempen Faithe, "Microsoft PowerPoint 2010 Bible", Wiley Publishing House.
3. Miller, M., "Internet Basics Absolute Beginner's Guide", Que Publishing, USA.
4. Miller, M., "Computer Basics Absolute Beginner's Guide", Que Publishing, USA.

E-Resources:

1. Microsoft Office Support provides tutorials and guides for MS Office applications. https://support.microsoft.com/en-us/training
2. Digital Skilling by NPTEL
   https://elearn.nptel.ac.in/shop/nptel/digital-skilling/?v=c86ee0d9d7ed

DEPARTMENT OF CIVIL ENGINEERING

Note - From Semester II onwards after every semester during vacation, students has to undergo for internship compulsory. The evaluation will be done in next successive semester.