



# VELS



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)

(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)

PALLAVARAM - CHENNAI

ACCREDITED BY NAAC WITH 'A' GRADE

*Marching Beyond 30 Years Successfully*

INSTITUTION WITH UGC 12B STATUS

**SCHOOL OF ENGINEERING**

**DEPARTMENT OF CIVIL ENGINEERING**

**3<sup>rd</sup> BOARD OF STUDIES MEETING – MINUTES**

**VENUE : CEB 005, CARD ROOM, VOC BLOCK**

**DATE :19.06.2022 & 11.00am**

Date :19.06.2022

**MINUTES OF MEETING OF THE THIRD BOARD OF STUDIES**  
**SCHOOL OF ENGINEERING : DEPARTMENT OF CIVIL ENGINEERING**

The Board of Studies meeting for the Programme **B.E- CIVIL ENGINEERING**, School of Engineering, VISTAS was held on 19<sup>th</sup> june 2022 at 11:00 am in CARD room, VOC Block to discuss the revision of **UG Programme Curriculum & Syllabus** of B.E CIVIL ENGINEERING and for the **regulation 2022** which to be followed from the academic year 2022-2023.

S.No	NAME OF THE BOARD MEMBER	DESIGNATION	ROLE
1	Dr. T. Ilango	<i>Associate Professor and Head</i> Dept. of Civil Engineering VISTAS, Chennai	Chairman
2	Dr. P. Purusothaman	<i>Associate Professor</i> Dept. of Civil Engineering SRM Institute of Science & Technology, Chennai	Academic Expert
3	Mr. K Gurusamy	<i>Project Manager</i> Rapid Rail Transit System L&T Metro, Chennai	Industrial Expert
4	Mr Pradeep	Site Engineer, Vishala Glazers Pvt Ltd, Chennai	Alumni Member
5	Dr R Jino	<i>Associate Professor</i> Dept. of Civil Engineering VISTAS, Chennai	Internal Member
6	Dr P R Kalyana Chakravarthy	<i>Assistant Professor</i> Dept. of Civil Engineering VISTAS, Chennai	Internal Member
7	Mrs M K Soundarya	<i>Assistant Professor</i> Dept. of Civil Engineering VISTAS, Chennai	Internal Member
8	Mrs S.Durgalakshmi	<i>Assistant Professor</i> Dept. of Civil Engineering VISTAS, Chennai	Internal Member

## AGENDA OF THE MEETING

ITEM NO.	PARTICULARS
BoS / 2022 / CE / UG / 3.1	Review and confirm minutes of 2 <sup>nd</sup> BOS meeting held on 21.03.2018
BoS / 2022 / CE / UG / 3.2	Review the curriculum based on Choice Based Credit System (CBCS) and Learning Outcome based Curriculum Development Framework (LOCF).
BoS / 2022 / CE / UG / 3.3	To review Revision and new course for new syllabus for B.E CIVIL ENGINEERING from regulation 2018 to Regulation 2022
BoS / 2022 / CE / UG / 3.4	To review the Feedback from Stakeholders to ensure that the syllabus of the courses include skill development, employability, and entrepreneurship
BoS / 2022 / CE / UG / 3.5	To review the UGC policy for CBCS and LOCF curriculum

### MINUTES OF THE MEETING

Dr. T.ILANGO, Associate Professor & Head, Chairperson, BoS initiated the meeting with a warm welcome and introduced the external members, the internal and co-opted members, and thanked them for accepting the invitation to the Board of Studies meeting.

#### ITEM NO.1 BoS / 2022 / CE / UG / 3.1

The First BoS Meeting for B.E CIVIL ENGINEERING under regulation 2018 was held on 21.03.2018 and confirmed the following points

- To implement the guidelines and suggestions of the new education policy.
- Syllabi for the soft skills offered by the Department of Civil Engineering.
- Value Added Courses for First, Second and Third Year Students.
- Admission Details.
- Department Vision, Mission in line with Institute's vision and Mission.

**Minutes are Reviewed and Confirmed**

#### ITEM NO: 2 BoS / 2022 / CE / UG / 3.2

- To develop the curriculum and syllabi based on the guidelines of Choice Based Credit System (CBCS) and Learning Outcome based Curriculum Framework (LOCF) shown in annexures.

**ITEM NO: 3 BoS / 2022 / CE / UG / 3.3**

- To develop the curriculum based on Learning Outcome-based Curriculum Framework (LOCF).
- To consider the present trend in the respective fields.
- To implement the guidelines and suggestions of the new education policy while preparing the curriculum.
- To eliminate the obsolete syllabus contents and to introduce the latest / updated technologies, new knowledge and practices.
- To design the curriculum focusing on Skill Development, Employability and Entrepreneurship.

**% of Syllabus Revision in the Program:**

**B.E CIVIL ENGINEERING – 26.6%**

S. No.	Available Course 2018-2019		Revised Course 2022-2023		% of Syllabus Revised
	Code	Name	Code	Name	
1.	18ECVI51	Energy Science & Engineering	22CMC031	Energy Science & Engineering	26.6%
2.	18ECV031	Engineering Mechanics	22CMC034	Engineering Mechanics	26.6%
3.	18ECV042	Surveying And Levelling	22CMC042	Surveying And Geomatic	30%
4.	18ECV051	Mechanics Of Materials	22CMC043	Mechanics Of Materials	40%
5.	18ECV046	Modern Surveying Laboratory	22CMV048	Modern Surveying Laboratory	30%
6.	18ECV043	Engineering Geology	22CMV046	Engineering Geology	26.6%
7.	18ECV110	Concrete Technology	22CMC062	Concrete Technology	30%
8.	18ECV111	Concrete Technology Laboratory	22CMC064	Concrete Technology Laboratory	30%
9.	18ECV054	Geotechnical Engineering	22CMC051	Geotechnical Engineering	26.6%
10.	18ECV055	Geotechnical Engineering Laboratory	22CMC054	Geotechnical Engineering Laboratory	26.6%
11.	18ECV056	Environmental Engineering Laboratory	22CMC055	Environmental Engineering Laboratory	26.6%
12.	18ECV064	Computer Aided Design And Drawing Laboratory	22CMC063	Computer Aided Design And Drawing Laboratory	26.6%

13.	18ECVI14	Soil Mechanics-I	22ECV105	Soil Mechanics-I	26.6%
14.	18ECVI15	Soil Mechanics-II	22ECV106	Soil Mechanics-II	26.6%
15.	18ECVI17	Irrigation Engineering	22ECVI15	Irrigation Engineering	26.6%
16.	18ECV156	Principle Of Architecture	22ECV154	Principle Of Architecture	26.6%
17.	18ECV044	Disaster Preparedness & Planning	22CMC044	Disaster Preparedness & Planning	26.6%

#### NEW COURSES INTRODUCED

1	22ECV102	Special Concrete
2	22MCMC41	Gender Institution And Society
3	22CMC041	Biology For Engineers
4	22CMC053	Construction Engineering Management
5	22ECV155	Public Transportation System
6	22ECV159	Principles of management and Professional ethics.
7	22ECV151	Organizational Behaviour

#### ITEM NO : 4 BoS / 2022 / CE / UG / 3.4

#### FEEDBACK FROM STAKEHOLDERS:

S.No	Name & Designation	Comments	Role
1	Mr. K Gurusamy <i>Project Manager</i> Rapid Rail Transit System L&T Metro, Chennai	The syllabus is to be revised with the current trends of Literature and Academia.	Industry Expert
2	Dr. P. Purusothaman <i>Associate Professor</i> Dept. of Civil Engineering SRM Institute of Science & Technology, Chennai.	The curriculum has the scope for development of requisite skills among the students.	Academic Expert

3	Dr P R Kalyana Chakravarthy <i>Assistant Professor</i> Dept. of Civil Engineering VISTAS, Chennai	The curriculum designed for the programme is updated and has the scope for providing knowledge on recent developments.	Internal Member
4	Mr Pradeep , <i>Site Engineer,</i> Vishala Glazers Pvt Ltd, Chennai.	The curriculum is in tune with the recent trends in construction and design fields.	Alumni member

**ITEM NO : 5 BoS / 2022 / CE / UG / 3.5**

**Status of Implementation of CBCS & LOCF:**

Revised Curriculum and Syllabus is based on Choice Based Credit System (CBCS) and following Learning outcome-based curriculum framework (LOCF) guidelines and template. Considered the Program Curriculum and Syllabus presented before the Board of Studies and discussed in details and resolved as follows:

- Resolved that the Curriculum & Syllabus for B.E – Civil Engineering programme (Regulation 2022), designed as per Model Curriculum framework of AICTE, effective from the Academic Year 2022-2023 be approved..

**New Curriculum & Syllabi of UG courses focused on Activities / Content with direct on Employability / Competency / Entrepreneurship / Skill development / Cross Cutting Issues / Interdisciplinary enclosed in Annexures**

CHAIRMAN



**Dr T Ilango**

Associate Professor and Head  
Dept. of Civil Engineering,  
VISTAS, Chennai

EXTERNAL MEMBER  
INDUSTRIAL EXPERT



**Mr. K Gurusamy**  
Project Manager  
Rapid Rail Transit System  
L&T Metro, Chennai

EXTERNAL MEMBER  
ACADEMIC EXPERT



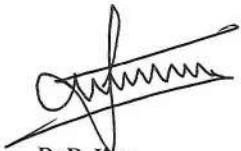
**Dr. P. Purusothaman**  
Associate Professor  
Dept. of Civil Engineering  
SRM Institute of  
Science & Technology,  
Chennai

EXTERNAL MEMBER  
ALUMINI MEMBER



**Mr Pradeep**  
Site Engineer,  
Vishala Glazers Pvt Ltd  
, Chennai

INTERNAL MEMBER



**Dr R Jijo**  
Assistant Professor  
Dept. of Civil Engineering  
VISTAS,  
Chennai

INTERNAL MEMBER



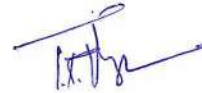
**Mrs S Durgalakshmi**  
Assistant Professor  
Dept. of Civil Engineering  
VISTAS,  
Chennai

INTERNAL MEMBER



**Mrs M K Soundarya**  
Assistant Professor  
Dept. of Civil Engineering  
VISTAS,  
Chennai

INTERNAL MEMBER



**Dr P R Kalyana Chakra varthy**  
Assistant Professor  
Dept. of Civil Engineering  
VISTAS,  
Chennai

**Annexure I**  
**B.E CIVIL ENGINEERING**



**B.E CIVIL ENGINEERING**

**Curriculum and Syllabus**

**Regulations 2022**

**(Based on Choice Based Credit System (CBCS)  
and  
Learning Outcome Based Curriculum Framework (LOCF))**

**Effective from the Academic Year  
2022-2023**

**DEPARTMENT OF CIVIL ENGINEERING  
SCHOOL OF ENGINEERING**



**B.E - CIVIL ENGINEERING CURRICULUM  
(MINIMUM CREDITS TO BE EARNED: 170)**

**SEMESTER 1**

Category	Course	Hours / Week			Credits	CA	SEE	Total
		Lecture	Tutorial	Practical				
HSC	English	2	-	-	2	40	60	100
BSC	Physics (Mechanics and Mechanics of Solids)	3	-	-	3	40	60	100
BSC	Mathematics I	3	1	-	4	40	60	100
ESC	Basic Electrical and Electronics Engineering	3	-	-	3	40	60	100
ESC (Blended)	Engineering Graphics and Design	1	-	4	3	40	60	100
HSC	English Laboratory	-	-	2	1	40	60	100
BSC	Physics Laboratory	-	-	2	1	40	60	100
ESC	Basic Electrical and Electronics Engineering Laboratory	-	-	2	1	40	60	100
MC	Constitution of India	2	-	-	-			100
MC	Student Induction Program	-	-	-	-	-	-	-
		<b>14</b>	<b>1</b>	<b>10</b>	<b>18</b>			

**SEMESTER 2**

Category	Course	Hours / Week			Credits	CA	SEE	Total
		Lecture	Tutorial	Practical				
BSC	Chemistry	3	-	-	3	40	60	100
BSC	Mathematics II	3	1	-	4	40	60	100
ESC	Programming for Problem Solving	3	-	-	3	40	60	100
ESC	Basics of Civil and Mechanical Engineering	3	-	-	3	40	60	100
ESC (Blended)	Workshop and Manufacturing Practices	1	-	4	3	40	60	100
BSC	Chemistry Laboratory	-	-	2	1	40	60	100
ESC	Programming for Problem Solving Laboratory	-	-	2	1	40	60	100
MC	Universal Human Values - 2	2	-	-	-			100
		<b>15</b>	<b>1</b>	<b>8</b>	<b>18</b>			

**SEMESTER 3**

Category	Course	Hours / Week			Credits	CA	SEE	Total
		Lecture	Tutorial	Practical				
BSC	Mathematics III	3	1	-	4	40	60	100
ESC	Energy Science & Engineering	3	-	-	3	40	60	100
PCC	Introduction to Fluid Mechanics	3	1	-	4	40	60	100
PCC	Introduction to Solid Mechanics	3	1	-	4	40	60	100
PCC (Blended)	Engineering Mechanics	3	-	2	4	40	60	100
PCC (Practical)	Strength of Materials Laboratory	-	-	2	1	40	60	100
PCC (Practical)	Hydraulics Laboratory	-	-	2	1	40	60	100
HSC	Personality Development I (Effective Technical Communication)	2	-	-	2	40	60	100
MC	Basic Life Skills	2	-	-	-			100

		<b>19</b>	<b>3</b>	<b>6</b>	<b>23</b>			
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#### SEMESTER 4

Category	Course	Hours / Week			Credits	CA	SEE	Total
		Lecture	Tutorial	Practical				
BSC	Biology for Engineers	2	-	-	2	40	60	100
PCC	Surveying & Geomatics	3	-	-	3	40	60	100
PCC	Mechanics of Materials	3	-	-	3	40	60	100
PCC	Disaster Preparedness & Planning	2	-	-	2	40	60	100
PCC	Transportation Engineering	3	-	-	3	40	60	100
PCC (Blended)	Engineering Geology	3	-	2	4	40	60	100
PCC (Practical)	Computer Aided Civil Engineering Drawing Laboratory	-	-	2	1	40	60	100
PCC (Practical)	Modern Surveying Laboratory	-	-	2	1	40	60	100
HSC	Personality Development II	2	-	-	2	40	60	100
BSC	Environmental Science and Engineering	3	-	-	3	40	60	100
MC	Gender Institution and Society	2	-	-	-			100
		<b>23</b>	<b>-</b>	<b>6</b>	<b>24</b>			

#### SEMESTER 5

Category	Course	Hours / Week			Credits	CA	SEE	Total
		Lecture	Tutorial	Practical				
PCC	Geotechnical Engineering	3	1	-	4	40	60	100
PCC	Structural Analysis	3	1	-	4	40	60	100
PEC	Professional Elective Course - I	3	-	-	3	40	60	100
OEC (Technical)	Open Elective Course - I	3	-	-	3	40	60	100
PCC (Blended)	Construction Engineering and Management	3	-	2	4	40	60	100
PCC (Practical)	Geotechnical Engineering Laboratory	-	-	2	1	40	60	100
PCC (Practical)	Environmental Engineering Laboratory	-	-	2	1	40	60	100
HSC	Personality Development III	2	-	-	2	40	60	100
PCC	Industrial Training/ Mini Project/ Survey Camp/ MOOC Course (NPTEL/SWAYAM/CourseEra/Mathworks) - Minimum 4 weeks	-	-	4	2			100
		<b>17</b>	<b>2</b>	<b>10</b>	<b>24</b>			

**SEMESTER 6**

Category	Course	Hours / Week			Credits	CA	SEE	Total
		Lecture	Tutorial	Practical				
PCC	Design of Reinforced Concrete Structures	3	-	-	3	40	60	100
PCC	Concrete Technology	3	-	-	3	40	60	100
PEC	Professional Elective Course - II	3	-	-	3	40	60	100
PEC (Blended)	Professional Elective Course - III	3	-	2	4			
OEC (Technical)	Open Elective Course - II	3	-	-	3	40	60	100
PCC (Practical)	Computer Aided Design and Drawing Laboratory	-	-	2	1	40	60	100
PCC (Practical)	Concrete Technology Laboratory	-	-	2	1	40	60	100
HSC	Personality Development - IV	2	-	-	2	40	60	100
PCC	Summer Internship (4 weeks)	-	-	4	2			100
		<b>17</b>	<b>0</b>	<b>10</b>	<b>22</b>			

**SEMESTER 7**

Category	Course	Hours / Week			Credits	CA	SEE	Total
		Lecture	Tutorial	Practical				
PCC	Engineering Economics, Estimation and Costing	3	-	-	3	40	60	100
OEC (Technical)	Open Elective Course - III	3	-	-	3	40	60	100
OEC (Technical/ Management )	Open Elective Course - IV	3	-	-	3	40	60	100
PEC	Professional Elective Course - IV	3	-	-	3	40	60	100
PEC (Blended)	Professional Elective Course - V	3	-	2	4	40	60	100
PCC (Practical)	Estimation and Costing Laboratory	-	-	2	1	40	60	100
Project	Project Phase I	-	-	10	5	40	60	100
		<b>15</b>	<b>0</b>	<b>14</b>	<b>22</b>			

**SEMESTER 8**

Category	Course	Hours / Week			Credits	CA	SEE	Total
		Lecture	Tutorial	Practical				
PEC	Professional Elective Course - VI	3	-	-	3	40	60	100
OEC( Technical)	Open Elective Course - V	3	-	-	3	40	60	100
OEC (Technical/ management)	Open Elective Course - VI	3	-	-	3	40	60	100
Project	Project Phase II	-	-	20	10	40	60	100
		<b>9</b>	<b>0</b>	<b>20</b>	<b>19</b>			

## SEMESTER -I

<b>22CGE101</b>	<b>ENGLISH</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

### Course Objectives

- To acquire ability to speak effectively in real life situations.
- To write letters and reports effectively in formal and business situations.
- To develop listening skills for academic and professional purposes.
- To gain effective speaking and listening skills in communication.
- To develop the soft skills and interpersonal skills to excel in their career.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment procedures.

### **UNIT I VOCABULARY BUILDING 08**

General Vocabulary –Nouns--Compound nouns, Synonyms, Antonyms, Prefixes and Suffixes, Homonyms, Homographs and Homophones, Changing words from one form to another, Acronyms and Abbreviations.-Instructions.

### **UNIT II BASIC WRITING 08**

Sentences structures –Kinds of sentences, Types of sentences, Clauses and Phrases, Punctuations, Blending and Clipping, Framing questions- Yes/No types and “Wh“ questions, Summarizing, Precise writing, Paragraph Writing.

### **UNIT III IDENTIFYING COMMON ERRORS IN ENGLISH 08**

Articles, Prepositions, Subject-verb Agreement, Pronouns - Relative pronouns, Demonstrative pronouns, Misplaced Modifiers, Redundancies, Clichés, Infinitives& Gerund , Checklist.

### **UNIT IV NATURE AND STYLE OF SENSIBLE WRITING 08**

Situational Dialogues, Process description, Definitions, Numerical Expressions, Recommendation, Information Transfer- Flow chart Bar chart and Pie chart, Writing introduction and conclusion.

### **UNIT V WRITING PRACTICES 08**

Active voice and Passive voice, Making negative sentences, Tenses, Letter Writing- Formal & Informal Letters, Report Writing- Letter Report, Accident Report, Investigation Report and Survey, Essay writing, Reading Comprehension Passages.

**TOTAL - 40 HOURS**

### **Text Books:**

- T1: Department of English, Anna University, Mindscapes, ‘English for Technologists and Engineers’, OrientLongman Pvt. Ltd, Chennai: 2012.
- T2: Department of Humanities and Social Sciences, Anna University, ‘English for Engineers and Technologists’ Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.
- T3: Department of English, Anna University, Mindscapes, ‘English for Technologists and Engineers’,Orient Longman Pvt. Ltd, Chennai: 2012.
- T4: Department of Humanities and Social Sciences, Anna University, ‘English for Engineers

and Technologists” Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.

T5: M. AshrafRizvi, “Effective Technical Communication”, Tata McGraw-Hill Publishing Company Limited, New Delhi.2009.

### Reference Books:

- R1: Practical English Usage. Michael Swan. OUP. 1995.  
 R2: Remedial English Grammar. F.T. Wood. Macmillan.2007  
 R3: On Writing Well. William Zinsser. Harper Resource Book. 2001  
 R4: Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.  
 R5: Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.  
 R6: Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

### Weblinks:

1. <https://ehlion.com/magazine/technical-english/>
2. [https://www.kkcl.org.uk/pdf/KKCL\\_Technical\\_English\\_for\\_Engineers\\_Brochure.pdf](https://www.kkcl.org.uk/pdf/KKCL_Technical_English_for_Engineers_Brochure.pdf)

### COURSE OUTCOMES

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills

<b>CO1:</b>	Improve the language proficiency of a technical under-graduate in English with emphasis on Learn, Speak, Read and Write skills	<b>K2</b>
<b>CO2:</b>	Develop listening skills for academic and professional purposes	<b>K3</b>
<b>CO3:</b>	Acquire the ability to speak effectively in English in real life situations	<b>K3</b>
<b>CO4:</b>	Provide learning environment to practice listening, speaking, reading and writing skills	<b>K3</b>
<b>CO5:</b>	Variety of self-instructional modes of language learning and develop learner autonomy	<b>K3</b>

<b>22CGE102</b>	<b>MECHANICS AND MECHANICS OF SOLIDS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives

- To learn the basic ideas of vector mechanics of particles, kinematics and their planar rigid bodies.
- To apply these fundamental principles to mechanics of solids related to materials used in engineering applications.

### UNIT I VECTOR MECHANICS OF PARTICLES 9

Scalar and vector quantities - Different types of vectors - Work-energy theorem - Newton’s laws of motion - Collisions - Elastic and inelastic collisions in one dimension - Conservative and non-conservative Forces - Expression for Five-term acceleration equation - Conservation of angular momentum - Definitions of damped oscillations, forced oscillations and resonance - Linear Harmonic oscillator - Expression for time period.

### UNIT II KINEMATICS 9

Definition and motion of a rigid body in the plane -Parallelogram law of vectors - Lami’s theorem - Experimental proof - Work done by a constant force - Angular displacement - Angular velocity - Angular acceleration - Relation between linear and angular velocities - Uniform circular motion - Law of conservation of linear momentum and its applications.

**UNIT III PLANAR RIGID BODY MECHANICS****9**

Rotational motion of rigid bodies – Comparison of linear and rotational motions - Equations of rotational motion - Rotational kinetic energy and moment of inertia of a rigid body - Theorems of moment of inertia: Parallel axes theorem and Perpendicular axes theorem - Moment of force - Angular momentum of a rigid body - Relation between torque and angular momentum

**UNIT IV STATICS****9**

Factor of safety - Different types of supports – Free body diagrams with examples on modelling of typical supports and joints – Types of equilibrium - Centre of mass of two particle systems – Principle of moments - Experimental determination of mass of the given body using principle of moments.

**UNIT V MECHANICS OF SOLIDS****9**

Concepts of elasticity - Stress-strain diagram - Hooke's law - Experimental verification of Hooke's law - Poisson's ratio - Modulus of elasticity - Factors affecting elasticity - Bending moment - Cantilever – Expression for depression -Young's modulus by uniform bending - I-shaped girders.

**TOTAL: 45 hours****Text Books:**

- T1: D. S. Mathur– Mechanics, II Edition, S. Chand and Co, 2001.  
 T2: Narayanamoorthy - Mechanics Part I and II, National Publishing Company, 2010.  
 T3: R. Murugesan - Mechanics and Mathematical Methods, 1st Edition, S. Chand and Co, 1996.  
 T4: Dr. P. Mani, 'A text book of Engineering Physics – II' Shri DhanamPublilsher, 2016.

**Reference Books:**

- R1: M.K. Harbola, Engineering Mechanics, Cengage learning India Publisher, 2009.  
 R2: M.K. Verma, Introduction to Mechanics, CRC press, 2009.  
 R3: D. Kleppner, R. Kolenkow, An Introduction to Mechanics, Tata McGraw Hill Education, 2007.  
 R4: E.P. Popov, Engineering Mechanics of Solids, Pearson publisher, 2015.

**Web Links:**

- [https://onlinecourses.nptel.ac.in/noc22\\_ce46/preview](https://onlinecourses.nptel.ac.in/noc22_ce46/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_me70/preview](https://onlinecourses.nptel.ac.in/noc21_me70/preview)
- [https://onlinecourses.nptel.ac.in/noc20\\_me01/preview](https://onlinecourses.nptel.ac.in/noc20_me01/preview)
- [https://www.vssut.ac.in/lecture\\_notes/lecture1423904717.pdf](https://www.vssut.ac.in/lecture_notes/lecture1423904717.pdf)

**COURSE OUTCOMES**

At the end of this course the students will be able to

<b>CO1:</b>	Demonstrate the basic ideas of five-term acceleration equation	<b>K3</b>
<b>CO2:</b>	Illustrate the fundamental concepts of kinematics	<b>K2</b>
<b>CO3:</b>	Identify the stress-strain curve of the solid materials	<b>K2</b>
<b>CO4:</b>	Illustrate the rotational equations of motion	<b>K3</b>
<b>CO5:</b>	Analyze the free body diagram and their applications	<b>K4</b>



## COURSE OUTCOMES

At the end of the course, the students will be able to

<b>CO1:</b>	Apply the concept of differential calculus and to evaluate the curvature, radius of curvature and envelope.	<b>K3</b>
<b>CO2:</b>	Evaluate the concept of limits, continuity and to evaluate derivatives.	<b>K5</b>
<b>CO3:</b>	Analyze the convergence of the series using root test, D'Alembert's test, Leibnitz's test	<b>K5</b>
<b>CO4:</b>	Determine the concept of limits, continuity and to evaluate derivatives with functions of several variables that is essential in most branches of engineering.	<b>K5</b>
<b>CO5:</b>	Evaluate the linear independence and dependence of vectors, linear transformations and inner product space.	<b>K5</b>

**22CGE104**

**BASIC ELECTRICAL ENGINEERING**

**L T P Credit**

**3 0 0 3**

### Course Objectives:

- To obtain basic knowledge on electrical quantities such as current, voltage, power and energy.
- To provide employability skill of adequate working knowledge on basic DC and AC circuits used in electrical and electronic devices. To understand the working principle, construction, applications of DC machines, AC machines & measuring instruments.

### UNIT I DC CIRCUITS

**12**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, Mesh and Nodal analysis, Analysis of simple circuits with dc excitation, Wye↔Delta Transformation, Superposition, Thevenin and Norton Theorems.

### UNIT II AC CIRCUITS

**12**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.

### UNIT III TRANSFORMERS

**12**

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

### UNIT IV ELECTRICAL MACHINES & POWER CONVERTERS

**12**

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Construction of Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. DC-DC buck and boost converters, duty ratio control. Single phase Bridge Rectifier, Single Phase voltage source inverters.

### UNIT V BASICS OF ELECTRONICS

**12**

Intrinsic semiconductors, Extrinsic semiconductors – P-type and N-type, P-N junction, VI Characteristics of PN junction diode, Zener effect, Zener diode, Zener diode Characteristics. Binary Number System — Boolean Algebra theorems– Logic gates- Introduction to sequential Circuits– Flip-Flops.



**Text Books:**

- T1: D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.  
 T2: D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.  
 T3: John Bird, "Electrical Circuit theory and technology", Routledge; 5th edition, 2013

**Reference Books:**

- R1: L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.  
 R2: E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.  
 R3: V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989 Text book

1

**Web Links:**

- <https://www.electricaltechnology.org/category/basic-electrical-fundamentals>
- <https://www.electrical4u.com/electrical-engineering-articles/basic-electrical/>

**COURSE OUTCOMES**

<b>CO1:</b>	Understand and analyse DC circuits	<b>K2</b>
<b>CO2:</b>	Understand and analyse AC circuits	<b>K2</b>
<b>CO3:</b>	Explain the construction, operation and characteristics of transformer and classify the types of three –phase transformer connections.	<b>K3</b>
<b>CO4:</b>	Understand and examine the various electrical machines and converter circuits	<b>K2</b>
<b>CO5:</b>	Identify the basics of electronics	<b>K3</b>

**22CGE105 ENGINEERING GRAPHICS & DESIGN**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>

**Course Objectives**

- To familiarize the students in basic concept of conic sections, projections and developments of objects.
- To develop the imagination and drafting skills of students and pictorial projections.

**UNIT I DIMENSIONING AND GEOMETRICAL CONSTRUCTION 12**

BIS - Lettering - Two systems of dimensioning, Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid, Epicycloid, Hypocycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

**UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 12**

Orthographic projection- Principles-Principal Planes-First angle projection-projection of points.Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

**UNIT III PROJECTION OF SOLIDS 12**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method

**UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 12**

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one

of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones

## UNIT V ORTHOGRAPHIC PROJECTION AND ISOMETRIC PROJECTION 12

General principles of orthographic projection – Need for importance of multiple views and their placement - layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects. Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

**TOTAL:60 hours**

### Text Books:

- T1: Bhatt N.D. and Panchal V.M., —Engineering Drawing, Charotar Publishing House, 50th Edition, 2010.  
T2: Parthasarathy N.S. and Vela Murali, —Engineering Drawing, Oxford University Press, New Delhi, 1 stEdition,2015

### Reference Books:

- R1: Natarajan K.V., —A text book of Engineering Graphics, Dhanalakshmi Publishers, Chennai, 31st Edition,2018.  
R2: Basant Agrawal and Agrawal C.M., —Engineering Drawing, Tata McGraw Hill Publishing Company Limited, New Delhi, 2nd Edition, 2013.

### Web Links:

1. <https://nptel.ac.in/courses/112103019>
2. <https://alison.com/course/diploma-in-engineering-drawing-and-computer-graphics>

## COURSE OUTCOMES

<b>CO1:</b>	Sketch the drawing standards, conventions and practices in engineering drawing	<b>K1</b>
<b>CO2:</b>	Draw the orthographic projections of points, straight lines and plane surfaces for solving some of the engineering problems in day-to-day applications.	<b>K1</b>
<b>CO3:</b>	Sketch the orthographic projections for the points, straight lines or solids using the change of position method.	<b>K1</b>
<b>CO4:</b>	Draw projections of sectioned solids and development of lateral surfaces and apply the concept to simple sheet metal work.	<b>K6</b>
<b>CO5:</b>	Draw the isometric projections for the given solids and combination of solids using box method and create 3D models	<b>K6</b>

<b>22CGE106</b>	<b>ENGLISH LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### Course Objectives

- To enable the student to explore knowledge in communication skills
- To gain knowledge in the process of Placement Interviews, Group Discussions and other recruitment procedures

### List of Experiments

1. Introduction to English sounds
2. Consonants and vowels
3. Syllable and Stress

4. Intonation
5. Communication Skills
6. Summarizing
7. Report Writing
8. Information Transfer
9. Presentation Skills
10. Group Discussion
11. Letter Writing
12. Cover letter and Resume

**Total- 30 Hours**

**Text Books:**

T1: Department of English, Anna University, Mindscapes, ‘English for Technologists and Engineers’, Orient Longman Pvt. Ltd, Chennai: 2012.

T2: M.AshrafRizvi, “Effective Technical Communication”, Tata McGraw-Hill Publishing Company Limited, New Delhi.2009.

**Reference Books:**

R1: Practical English Usage. Michael Swan. OUP. 1995.

R2: Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

R3: Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

**Weblinks:**

1. <https://onlinemasters.ohio.edu/blog/engineering-communication/>
2. <https://online.rice.edu/courses/communication-skills-for-engineers-specialization>

**Course Outcome**

<b>CO1:</b>	Distinguish various listening & written contexts for understanding the implied meanings and responding to them accordingly.	<b>K5</b>
<b>CO2:</b>	Use appropriate pronunciation and rhythm of spoken language in oral communication	<b>K4</b>
<b>CO3:</b>	Draft and interpret the written communication in official contexts like narrative, descriptive, creative, critical and analytical reports	<b>K5</b>
<b>CO4:</b>	Infer implied meanings of different genres of texts and critically analyze and evaluate them for ideas, as well as for method of oral presentation.	<b>K4</b>
<b>CO5:</b>	Make use of suitable communicative strategies to express their point of views convincingly in any type of discussions, negotiation and conversations.	<b>K2</b>

<b>22CGE107</b>	<b>ENGINEERING PRACTICAL PHYSICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Objectives**

- To enable the student to explore the field of Mechanics of Solids and Properties of Matter.
- To gain knowledge in the scientific methods and learn the process of measuring different Physical variables.

**Any Eight Experiments**

1. Determination of Rigidity Modulus – Torsional pendulum

2. Determination of wavelength and particle size using laser
3. Ultrasonic Interferometer
4. Determination of band gap of a semiconductor material
5. Hooke's law – Determination of spring constant
6. Determination of Young's Modulus – Uniform Bending
7. Determination of Young's Modulus – Non Uniform Bending
8. Determination of Viscosity of a liquid - Poiseuille's method
9. Spectrometer – Grating
10. Deflection Magnetometer - Tan A position
11. Deflection Magnetometer - Tan B position
12. Potentiometer - Calibration of low range Voltmeter

**Text Books:**

- T1: C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics, 1<sup>st</sup> Edition, 2015.  
 T2: Biswajit Saha, Practical Physics Book, LAP LAMBERT Academic Publishing, 1<sup>st</sup> Edition, 2020.

**Reference Books:**

- R1: G.L. Squires, Practical Physics, 4th Edition, Cambridge University Press, 2001.  
 R2: D. Chattopadhyay, P.C. Rakshit, B. Saha, "An Advanced Course in Practical Physics", 2nd ed., Books & Allied Ltd., Calcutta, 1990.

**Web Links:**

1. <http://amrita.olabs.edu.in/?sub=1&brch=5&sim=155&cnt=2>
2. <https://vlab.amrita.edu/index.php?sub=1&brch=280&sim=1509&cnt=4>

**COURSE OUTCOMES**

At the end of this course the students will be able to

<b>CO1:</b>	Measure the wavelength and particle size of semiconductor diode laser.	<b>K3</b>
<b>CO2:</b>	Analyze the coefficient of viscosity of a liquid	<b>K4</b>
<b>CO3:</b>	Estimate the band gap energy of given semiconductor material.	<b>K5</b>
<b>CO4:</b>	Determine the compressibility of the liquid using ultrasonic interferometer	<b>K4</b>
<b>CO5:</b>	Measure the Young's modulus of the given solid materials	<b>K3</b>

<b>22CGE108</b>	<b>BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Objectives**

- To provide comprehensive idea about AC and D C circuit analysis, working principles and applications of basic machines in electrical engineering.
- To expose the students to learn experimental skills about Transformers, DC Motor, Converters.

**LIST OF EXPERIMENTS**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification.
3. Loading of a transformer: measurement of primary and secondary voltages and currents, and power
4. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).
5. Load Characteristics of a DC Motor
6. Torque - Slip Characteristic of an Induction motor
7. Three phase induction motors – Direction reversal by change of phase-sequence of

connections.

8. Demonstration of DC-DC Converter.

9. Demonstration of DC-AC converter.

10. Demonstration of AC-DC converter.

**TOTAL: 30 h**

### **COURSE OUTCOMES**

<b>CO1:</b>	Understand the basic safety precautions and learn to make use of measuring instruments	<b>K2</b>
<b>CO2:</b>	Analyze the steady state response of R-L, R-C circuits	<b>K3</b>
<b>CO3:</b>	Experiment with loading of transformer to measure the primary and secondary voltages, currents and power and classify the different types of transformer connections	<b>K3</b>
<b>CO4:</b>	Understand and Experiment with single phase induction motor and three phase induction motor	<b>K2</b>
<b>CO5:</b>	Demonstrate DC-DC, DC-AC and AC-DC converters	<b>K4</b>

<b>22MCMC11</b>	<b>CONSTITUTION OF INDIA</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

### **COURSE OBJECTIVES:**

- The purpose of the course is to acquaint the students with basic principles of the Constitution of India and its working.
- To help students be familiar with the historical and significant aspects of the constitution of India.
- To make students aware of their fundamental duties and rights.
- To know about central and state government functionalities in India.

### **UNIT I NATURE, OBJECT AND SCOPE OF THE CONSTITUTION 6**

Nature, object and scope of Constitutional Law and Constitutionalism – Historical Perspective of the Constitution of India – Salient Features and Characteristics of Constitution of India.

### **UNIT II FUNDAMENTAL RIGHTS 6**

Nature and scope of Fundamental Rights – Scheme of Fundamental Rights – Right to Equality – Right to Freedom of Speech and Expression – Right to Life – Right against Exploitation – Right to Religious Freedom – Minority Rights.

### **UNIT III DIRECTIVE PRINCIPLES OF STATE POLICY AND FUNDAMENTAL DUTIES 6**

Directive Principles of State Policy – Importance and Implementation – Scheme of Fundamental Duties and its Legal Status.

### **UNIT IV FEDERAL STRUCTURE 6**

Federal Structure – Distribution of Legislative and Financial Powers between the Union and the States – Parliamentary Form of Government in India – Constituent Powers and Status of the President of India.

### **UNIT V AMENDMENT AND EMERGENCY PROVISIONS 6**

Amendment of the Constitution – Procedure – Historical Perspective of the Constitutional

**COURSE OUTCOME:**

At the end of this course the students will be able to

<b>CO1:</b>	Elaborate the constitution of India and its salient features	<b>K2</b>
<b>CO2:</b>	Know the fundamental rights and duties	<b>K2</b>
<b>CO3:</b>	Discuss the Parliamentary Form of Government in India	<b>K2</b>
<b>CO4:</b>	Recognize the Directive Principles of State Policy	<b>K2</b>
<b>CO5:</b>	Understand and abide the rules of the Indian constitution and to appreciate different culture among the people	<b>K2</b>

**Text Books:**

T1: V.N. Shukla, Constitutional Law of India

T2: D.D. Basu, Commentary on the Constitution of India

T3: J.N. Pandey, Constitution of India

T4: Durga Das Basu, “Introduction to the Constitution of India “, Prentice Hall of India, New Delhi.

T5: R.C. Agarwal, (1997) “Indian Political System”, S.Chand and Company, New Delhi.

T6: Maciver and Page, “Society: An Introduction Analysis “, Mac Milan India Ltd., New Delhi.

T7: K.L.Sharma, (1997) “Social Stratification in India: Issues and Themes”, Jawaharlal Nehru University, New Delhi.

**References Books:**

R1: V.D. Mahajan, Constitutional Law of India

R2: H.M. Seervai, Constitution of India

R3: Sharma, Brij Kishore, “Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.

R4: U.R.Gahai, “Indian Political System “, New Academic Publishing House, Jalaendhar.

R5: R.N. Sharma, “Indian Social Problems “, Media Promoters and Publishers Pvt. Ltd.

**COURSE OUTCOMES**

<b>CO1:</b>	Elaborate the constitution of India and its salient features.	<b>K2</b>
<b>CO2:</b>	Know the fundamental rights and duties.	<b>K2</b>
<b>CO3:</b>	Discuss the Parliamentary Form of Government in ndia.	<b>K2</b>
<b>CO4:</b>	Recognize the Directive Principles of State Policy.	<b>K3</b>
<b>CO5:</b>	Understand and abide the rules of the Indian constitution and to appreciate different culture among the people	<b>K3</b>

## SEMESTER -II

		L	T	P	Credits
22CGE201	ENGINEERING CHEMISTRY	3	0	0	3

### Course Objectives

- To learn about the molecular orbitals, ionic interactions and periodic properties.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electro negativity.
- List major chemical reactions that are used in the synthesis of molecules.

### UNIT I ATOMIC AND MOLECULAR STRUCTURE, INTERMOLECULAR FORCES 9 AND POTENTIAL ENERGY SURFACES

Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene, benzene and aromaticity. Valence Bond Theory and the energy level diagrams for transition metal ions and their magnetic properties. Ionic, dipolar and van Der Waals interactions, potential energy surfaces of H<sub>3</sub>, H<sub>2</sub>F and HCN.

### UNIT II SPECTROSCOPIC TECHNIQUES AND APPLICATIONS 9

Principles of spectroscopy and selection rules. Electronic spectroscopy. Vibrational, rotational spectroscopy of diatomic molecules, Morse equations and Mossbauer spectroscopy. Applications. Diffraction and scattering

### UNIT III USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA 9

Thermodynamic functions: energy, entropy, free energy and fugacity. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion.

### UNIT IV PERIODIC PROPERTIES 9

Variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, diagonal relationship, anomalous behaviour of Lithium, carbon and Nitrogen, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

### UNIT V ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE 9

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization, Coupling reaction and ring openings. Synthesis of a commonly used drug molecule.

**TOTAL: 45 hours**

### Text Books

- T1: Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane.  
T2: Fundamentals of Molecular Spectroscopy, by C. N. Banwell.  
T3: Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan.

### Reference Books

- R1: Physical Chemistry, by P. W. Atkins.





Karl Pearson's Coefficient of correlation, Spearman's Rank Correlation Coefficient. Regression: Regression Lines and Regression equations - simple problems

**UNIT IV BASIC STATISTICS 12**

Introduction-Measures of Central tendency: Mean, Median and Mode- Measure of Dispersion-Range, Mean deviation- Standard Deviation and coefficient of variation

**UNIT V SAMPLING 12**

Introduction to small sample – t-test-Single mean, difference of means, and Paired t-test- F-test-Chi-square test for goodness of fit and independence of attributes.

**Total: 60 Hours**

**Text Books**

- T1: N.P. Bali and Manish Goyal, A text book of engineering mathematics, laxmi publications, reprint, 2014 (Ninth Edition)
- T2: S.P.Gupta, Statistical Methods. Sultan Chand & Sons, New Delhi
- T3: S.C. Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons, 3rd Edition, 2001.
- T4: S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

**Reference Books**

- R1: Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- R2: P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
- R3: W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
- R4: B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

**COURSE OUTCOMES:**

<b>CO1:</b>	Apply the fundamental concepts of probability.	<b>K3</b>
<b>CO2:</b>	Understand of standard distributions which can describe real life phenomenon.	<b>K2</b>
<b>CO3:</b>	Understand and critically discuss the issues surrounding of correlation and Regression	<b>K3</b>
<b>CO4:</b>	Evaluate the underlying assumptions of analysis tools of measures of central tendency and dispersion	<b>K4</b>
<b>CO5:</b>	Analyze the uses and limitations of Testing of hypothesis used in engineering	<b>K4</b>

<b>22CGE203</b>	<b>PROGRAMMING FOR PROBLEM SOLVING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

- To understand the basic concepts of programming – Flow chart, Pseudocode
- To learn the fundamentals of C programming - declarations, operators, expressions and control statements.
- To learn the manipulation of strings, functions, pointers and file operations
- To understand the concepts of arrays, basic sorting and searching algorithms.
- To find the order of time complexity of basic algorithms

**UNIT I INTRODUCTION TO PROGRAMMING 9**

Introduction to Programming (Flow chart/pseudo code, compilation etc.), Variables (including data



- Engineering Profession in satisfying the societal needs.
- To help students acquire knowledge in the basics of surveying and the materials used for Construction.
- To provide an insight to the essentials of components of a building and the infrastructure Facilities.
- To explain the component of power plant units and detailed explanation to IC engines their Working principles.
- To explain the Refrigeration & Air-conditioning system.

**UNIT I PART A: OVERVIEW OF CIVIL ENGINEERING 5**

Civil Engineering contributions to the welfare of Society - Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering – National building code – terminologists: Plinth area, Carpet area, Floor area, Buildup area, Floor space index - Types of buildings: Residential buildings, Industrial buildings.

**UNIT I PART B: OVERVIEW OF MECHANICAL ENGINEERING 4**

Overview of Mechanical Engineering - Mechanical Engineering Contributions to the welfare of Society –Specialized sub disciplines in Mechanical Engineering – Manufacturing, Automation, Automobile and Energy Engineering - Interdisciplinary concepts in Mechanical Engineering.

**UNIT II SURVEYING AND CIVIL ENGINEERING MATERIALS 9**

Surveying: Objects – Classification – Principles – Measurements of Distances and angles – Leveling – Determination of areas– Contours. Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel - Timber – Modern Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building component (brief discussion only)

**UNIT III BUILDING COMPONENTS AND INFRASTRUCTURE 9**

Building plans – Setting out of a Building - Foundations: Types of foundations - Bearing capacity and settlement – Brick masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering. Types of Bridges and Dams – Water Supply Network - Rain Water Harvesting – Solid Waste Management - Introduction to Highways and Railways - Introduction to Green Buildings.

**UNIT IV INTERNAL COMBUSTION ENGINES AND POWER PLANTS 9**

Classification of Power Plants- Working principle of steam, Gas, Diesel, Hydro -electric and Nuclear Power plants- Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines. Working principle of Boilers-Turbines, Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps, Concept of hybrid engines. Industrial safety practices and protective devices

**UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 9**

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner. Properties of air - water mixture, concepts of psychometric and its process.

**TOTAL: 45 Hours**

**TEXT BOOKS:**

T1:G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018

**REFERENCES:**

- R1:Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2018  
 R2:Ramamrutham S., “Basic Civil Engineering”,Dhanpat Rai Publishing Co.(P) Ltd, 2013.  
 R3:Seetharaman S., “Basic Civil Engineering”, Anuradha Agencies, 2005.  
 R4:Shantha Kumar SRJ., “Basic Mechanical Engineering”, Hi-tech Publications,  
 Mayiladuthurai,  
 2000.

**Web Links:**

1. <https://nptel.ac.in/courses/105106201>
2. <https://geekztrainerblog.wordpress.com/basic-civil-and-mechanical-engineering/>

**COURSE OUTCOMES:**

CO1	Understanding profession of Civil and Mechanical engineering.	K2
CO2	Summarise the planning of building, infrastructure and working of Machineries.	K2
CO3	Apply the knowledge gained in respective discipline	K3
CO4	Illustrate the ideas of Civil and Mechanical Engineering applications.	K2
CO5	Appraise the material, Structures, machines and energy.	K3

<b>22CGE205 WORKSHOP AND MANUFACTURING PRACTICES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>

**COURSE OBJECTIVS: (Skill development)**

- To study bench fitting drawings for making male and female fittings as per the given dimensions and Tolerances.
- To study sheet metal development drawings for making common metal parts/components as per the given dimensions.

**DETAILED CONTENTS:**

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods (3lectures)
2. CNC machining, Additive manufacturing (1 lecture)
3. Fitting operations & power tools (1 lecture)
4. Electrical &Electronics (1 lecture)
5. Carpentry (1 lecture)
6. Plastic moulding, glass cutting (1 lecture)
7. Metal casting (1 lecture)
8. Welding (arc welding & gas welding), brazing (1 lecture)

**WORKSHOP PRACTICE:**

1. **MACHINE SHOP** **9**  
 Machining: Basics of Machining Processes Equipment’s, Simple turning of cylindrical surface on MS rod using lathe machine tool,To make Facing and plain turning, step turning, drilling in the lathe
2. **FITTING SHOP** **9**  
 To make square, V joint in bench fitting as per the given dimension and tolerances, Tools and demonstration of producing model
3. **CARPENTRY** **9**  
 Basics of Carpentry operations, Equipment’s ,To make half lap joint, dovetail, TEE Lap joint ,Cross halving joint of two wooden pieces at perpendicular direction,

#### 4. WELDING SHOP

9

To make single, butt, lap and T fillet joint by arc welding with the back hand and fore hand welding techniques as per the given dimensions. To make simple Dust pan, Rectangular trays in sheet metal with the jigs as per the given Dimensions.

#### 5. PLUMBING WORKS

9

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings. Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

**TOTAL : 45 hours**

#### TEXT BOOK:

T1: Jeyachandran K., Natarajan S. & Balasubramanian S., A Primer on Engineering Practices Laboratory, Anuradha Publications, 2007

#### REFERENCE BOOKS:

R1: Jeyapoovan T., Saravanapandian M. & Pranitha S., Engineering Practices Lab Manual, Vikas Publishing House Pvt.Ltd, 2006.

R2: Bawa H.S., Workshop Practice, Tata McGraw, 2007. 4. Rajendra Prasad A. & Sarma P.M.M.S., Workshop Practice, Sree Sai Publication, 2002

#### COURSE OUTCOMES

<b>CO1:</b>	Experiment with facing, Turning and various types of fitting joint	<b>K 1</b>
<b>CO2:</b>	Develop the half lap joint, TEE Lap joint carpentry and welding.	<b>K 5</b>
<b>CO3:</b>	Practice casting, moulding, & smithy trades	<b>K 2</b>
<b>CO4:</b>	Developments of sheet metal jobs from GI sheets, knowledge of basic concepts of soldering	<b>K 5</b>
<b>CO5:</b>	Make a Basic pipe connections for Mixed pipe material connection and Pipe connections with different joining components	<b>K 1</b>

#### 22CGE206 ENGINEERING CHEMISTRY PRACTICALS

L	T	P	Credits
0	0	2	1

#### Course Objectives

- The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.
- The students will learn to:
  - Estimate rate constants of reactions from concentration of reactants/products as a function of time.
  - Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
  - Synthesize a small drug molecule.

#### Any Eight Experiments

1. Determination of the rate constant of a reaction.
2. Determination of the partition coefficient of a substance between two immiscible liquids.
3. Determination of surface tension and viscosity.
4. Thin layer chromatography.
5. Determination of chloride content in water.
6. Determination of cell constant and conductance of solutions.
7. Synthesis of a polymer/drug.

8. Determination of saponification / acid value of an oil.
9. Determination of redox potentials and emf by Potentiometric method.
10. Estimate the adsorption of acetic acid by charcoal.

### Text Books

- T1: S. Sundaram and K. Raghavan “Practical Chemistry”, S. Viswanathan. Co. 3<sup>rd</sup> edition 2011.
- T2: Gnanaprakasam, Ramamurthy, “Organic Chemistry Lab Manual” S. Viswanathan Pvt. Ltd. 3<sup>rd</sup> edition 2011.

### Reference Books

- R1: Vogel’s – “Textbook of qualitative organic Analysis”, Longmann, 12<sup>th</sup> edition, 2011
- R2: J. N. Gurtu and R. Kapoor “Advanced experimental Chemistry”, S. Chand and Co. 6<sup>th</sup> edition, 2010.

### Web Links

1. <https://www.khanacademy.org/science/ap-chemistry-beta/x2eef969c74e0d802:kinetics/x2eef969c74e0d802:introduction-to-rate-law/v/experimental-determination-of-rate-laws>
2. <https://www.youtube.com/watch?v=qdmKGskCyh8>
3. [https://www.youtube.com/watch?v=7\\_6\\_dKlo67k](https://www.youtube.com/watch?v=7_6_dKlo67k)

### COURSE OUTCOMES

At the end of this course the students will be able to

<b>CO1:</b>	Estimate the rate constants of reactions and partition coefficient of immiscible liquids	<b>K4</b>
<b>CO2:</b>	Find the viscosity and to test the purity of the compound	<b>K4</b>
<b>CO3:</b>	Estimate the amount of chlorine content present in drinking water and to know the conductance of a solution	<b>K4</b>
<b>CO4:</b>	Develop a small drug molecule and to know the saponification of an oil	<b>K6</b>
<b>CO5:</b>	Find out the unknown element by Potentiometric method and to remove some of the toxic chemical by charcoal method	<b>K3</b>

<b>22CGE207 PROGRAMMING FOR PROBLEM SOLVING LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### Course Objective:

- To design and develop C Programs for various applications

### List of Experiments:

1. Familiarization with programming environment
2. Simple computational problems using arithmetic expressions
3. Problems involving if-then-else structures
4. Iterative problems
5. 1D Array manipulation
6. Matrix problems
7. String operations
8. Simple functions
9. Solving Numerical methods problems
10. Recursive functions
11. Pointers and structures
12. File operations

**Total: 30 h**

## COURSE OUTCOMES

<b>CO1:</b>	Determine the advanced features of the C language	<b>K5</b>
<b>CO2:</b>	Develop the model data using primitive and structured types.	<b>K5</b>
<b>CO3:</b>	Construct programs that demonstrate effective use of C features including arrays, structures, pointers and files.	<b>K4</b>
<b>CO4:</b>	Develops the ability to analyze a problem, develop an algorithm to solve it.	<b>K5</b>
<b>CO5:</b>	Develops the use of the C programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.	<b>K6</b>

<b>22MCMC21</b>	<b>UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

### COURSE OBJECTIVES:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

### **UNIT I COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION 6**

Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration—what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

### **UNIT II UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF 6**

Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha, Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health

### **UNIT III UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP 6**

Understanding harmony in the Family- the basic unit of human interaction, Understanding values in a human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship, Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Samman*, Difference between respect and differentiation; the other

salient values in relationship, Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitvaas* comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!.

**UNIT IV UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE –  
WHOLE EXISTENCE AS CO-EXISTENCE 6**

Understanding the harmony in Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

**UNIT V IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF  
HARMONY ON PROFESSIONAL ETHICS 6**

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for the transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.

**Total: 30 Hours**

**Text Books:**

T1:R Gaur, R Sangal, G P Bagaria, Human Values and Professional Ethics Excel Books, New Delhi, 2010

**References:**

- R1:Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins,USA
- R2:E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond &Briggs,Britain.
- R3:Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
- R4:Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.

**COURSE OUTCOMES**

<b>CO1:</b>	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society (K2)	<b>K2</b>
<b>CO2:</b>	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.	<b>K3</b>
<b>CO3:</b>	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore the role in ensuring a harmonious society	<b>K2</b>
<b>CO4:</b>	Understand the harmony in nature and existence and work out their mutually fulfilling participation in the nature.	<b>K3</b>
<b>CO5:</b>	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.	<b>K3</b>





<b>CO3:</b>	Derive and obtain the solution of wave, heat equation	<b>K3</b>
<b>CO4:</b>	Apply Fourier series and Fourier transforms used in engineering applications	<b>K4</b>
<b>CO5:</b>	Understand the z-transforms and its properties	<b>K2</b>

<b>22CMC031</b>	<b>ENERGY SCIENCE &amp; ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVE: (Employability)**

At the end of the course, the students will be able

- Categorize effect of using the sources on the environment and climate.
- List the various the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.
- Explain the concepts of green buildings.
- Explain the basics of energy system and resources.
- List and describe the primary renewable energy resources and technologies.

### **UNIT I INTRODUCTION TO ENERGY SCIENCE 9**

Scientific principles and historical interpretation - to place energy use in the context of pressing societal, environmental and climate issues - Introduction to energy systems and resources - Introduction to Energy, sustainability & the Environment.

### **UNIT II ENERGY SOURCES 9**

Overview of energy systems, sources, transformations, efficiency, and storage - Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade - offs of different energy systems - possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

### **UNIT III ENERGY & ENVIRONMENT 9**

Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development - Carbon footprint, energy consumption and sustainability - introduction to the economics of energy - How the economic system determines production and consumption - linkages between economic and environmental outcomes - How future energy use can be influenced by economic, environmental, trade, and research policy

### **UNIT IV CIVIL ENGINEERING PROJECTS CONNECTED WITH THE ENERGY SOURCES 9**

Coal mining technologies, Oil exploration offshore platforms, Underground and under - sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers - hydro power stations above - ground and underground along with associated dams, tunnels, penstocks, etc., - Nuclear reactor containment buildings and associated buildings, design and construction constraints and testing procedures for reactor containment buildings - Spent Nuclear fuel storage and disposal systems

### **UNIT V ENGINEERING FOR ENERGY CONSERVATION 9**

Concept of Green Building and Green Architecture – Green building concepts (Green building encompasses everything from the choice of building materials to where a building is located, how it is designed and operated) – LEED ratings – Identification of energy related enterprises that

represent the breath of the industry and prioritizing these as candidates – Embodied energy analysis and use as a tool for measuring sustainability – Energy Audit of Facilities and optimization of energy consumption.

**Total: 45 Hours**

**Text Books:**

- T1: Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford University
- T2: Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press
- T3: Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living,

**Reference Books:**

- R1: Jean-Philippe; Zaccour, Georges (Eds.), (2005), Energy and Environment Set: Mathematics of Decision Making, Loulou, Richard; Waaub, XVIII,
- R2: Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A. (2006) Energy and the Environment, 2nd Edition, John Wiley
- R3: UNDP (2000), Energy and the Challenge of Sustainability, World Energy assessment
- R4: E H Thorndike (1976), Energy & Environment: A Primer for Scientists and Engineers, Addison- Wesley Publishing Company

**Web Links:**

1. [https://onlinecourses.nptel.ac.in/noc21\\_ph33/preview](https://onlinecourses.nptel.ac.in/noc21_ph33/preview)
2. [https://onlinecourses.nptel.ac.in/noc22\\_hs43/preview](https://onlinecourses.nptel.ac.in/noc22_hs43/preview)
3. [https://onlinecourses.swayam2.ac.in/nou20\\_cs09/preview](https://onlinecourses.swayam2.ac.in/nou20_cs09/preview)
4. [https://onlinecourses.swayam2.ac.in/nou21\\_ge33/preview](https://onlinecourses.swayam2.ac.in/nou21_ge33/preview)

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO1:</b>	Relate main sources of energy and their primary applications	<b>K2</b>
<b>CO2:</b>	Outline and understand effect of using energy sources on the environment and climate	<b>K2</b>
<b>CO3:</b>	Compare and contrast impacts associated with the use of various energy sources on environment	<b>K4</b>
<b>CO4:</b>	Design Civil engineering projects utilizing energy sources	<b>K3</b>
<b>CO5:</b>	Assess and Plan energy conservation and optimization for energy consumption	<b>K4</b>

**22CMC032INTRODUCTION TO FLUID MECHANICS**

**L T P Credits**  
**3 0 0 3**

**Course Objectives**

At the end of the course, the students will be able

- To understand the basic properties of the fluid and principles of fluid kinematics and fluid dynamics
- To analyse the complexities involved in solving the fluid flow problems

**UNIT I FLUID PROPERTIES**

**8**

Fluid – Definition, Distinction between Solid and Fluid - Units and dimensions - Properties of fluids - Density, Specific weight, Specific volume, Specific gravity, viscosity, compressibility, Vapour pressure, Capillarity and Surface tension, Bulk Modulus- Applications

**UNIT II FLUID STATICS**

**8**

Concept of Fluid Static Pressure, Pascal’s law- Absolute and gauge pressures - Pressure

measurements by Manometers-Forces on planes – Centre of pressure – Buoyancy and floatation- Metacentre- Stability of floating and submerged bodies.

**UNIT III FLUID KINEMATICS AND DYNAMICS 12**

Fluid Kinematics – Classification and types of flow - Velocity field and Acceleration - Continuity equation (One and Three dimensional differential forms) - Stream line-Streak line- Path line- Stream function - Velocity potential function - Flow net.

Fluid dynamics - Equations of motion -Euler's equation along a streamline - Bernoulli's equation – Applications - Venturimeter, Orificemeter and Pitot tube- Linear momentum equation and its application to pipe bend.

**UNIT IV FLOW THROUGH PIPES 8**

Definition of Boundary layer- Reynold's experiment - laminar flow through circular pipe (Hagen poiseulle's) - hydraulic and energy gradient – Flow through pipes - Darcy - Weisbach's equation - Pipe roughness -Friction factor- Moody's diagram- Major and Minor losses of flow in pipes - Pipes in series and in parallel- Equivalent pipe.

**UNIT V DIMENSIONAL ANALYSIS AND MODEL STUDIES 9**

Fundamental dimensions - Dimensional homogeneity - Rayleigh's method and Buckingham Pi-theorem - dimensionless parameters - Similitudes and model studies - Distorted models.

**TOTAL: 45 hours**

**Text Books:**

T1: Bansal.R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications Pvt. Ltd., New Delhi, 2013

T2: Subramanya.K " Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Private Limited, New Delhi, 2010.

T3: Rajput.R.K. "Fluid Mechanics", S.Chand and Co, New Delhi, 2008.

**Reference Books:**

R1: Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2009.

R2: Jain.A.K., "Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, Twelfth Edition, 2016.

R3: Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw Hill, 2000.

**Web Links:**

1. <https://nptel.ac.in/courses/105105168>
2. <https://nptel.ac.in/courses/105103207>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO1:</b>	Apply the basic properties of fluids and apply Newton's Law of Viscosity in solving practical Problems	<b>K4</b>
<b>CO2:</b>	Determine the forces and pressure acting on surfaces and hydraulic structures, floatation and stability of floating bodies like boats, ships, naval vessels etc.	<b>K3</b>
<b>CO3:</b>	Apply the principles of kinematics with specific emphasis on application of continuity equation, stream function and determine the discharge by using Bernoulli's equation	<b>K4</b>

<b>CO4:</b>	Determine the major, minor and equivalent losses in pipe	<b>K3</b>
<b>CO5:</b>	Understand the fundamentals of dimensional analysis and model studies	<b>K2</b>

<b>22CMC033 INTRODUCTION TO SOLID MECHANICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVE: (Employability)**

At the end of the course, the students will be able

- To learn fundamental concepts of stress, strain and deformation of solids with applications to bars, beams and thin cylinders.
- To analyse a complex two dimensional state of stress and plane trusses
- To understand the effect of torsion on shafts and springs.
- To learn the advanced topics in the bending of beams with the stress distribution in thin and thick cylinders.

### **UNIT I SIMPLE STRESSES AND STRAINS 15**

Concept of stress and strain, St. Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains, Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

### **UNIT II COMPOUND STRESSES AND STRAINS 15**

Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants

### **UNIT III FLEXURAL STRESSES AND SHEAR STRESSES 15**

Theory of simple bending – Assumptions – Derivation of bending equation:  $M/I = f/y = E/R$  - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections. Shear Stresses- Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

### **UNIT IV TORSION 9**

Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion. Analysis of close-coiled-helical springs.

### **UNIT V THIN CYLINDERS AND SPHERES 6**

Thin Cylinders and Spheres- Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder, and sphere subjected to internal pressures.

**TOTAL: 60 hours**

### **TEXT BOOKS:**

- T1: Rajput R.K, "Strength of Materials", S.Chand & Company Ltd., New Delhi, 2014.  
T2: Bansal R.K., "Strength of Materials", Laxmi Publications, New Delhi - Fifth Edition, 2012.  
T3: Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain, "Mechanics of Material", Laxmi Publications, Reprint, 10th Edition, 2009.





<b>CO4:</b>	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.	<b>K3</b>
<b>CO5:</b>	Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals	<b>K2</b>

## 22CMC03 STRENGTH OF MATERIALS LABORATORY

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### COURSE OBJECTIVE: (Skill Development)

At the end of the course, the students will be able

- To study the properties of materials when subjected to different types of loading
- To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally
- To determine the relationship between the stress and strain on deformable solids, to analyse the members subjected to axial, bending and torsion loads

### LIST OF EXPERIMENTS

1. Tension test on mild steel / tor steel rod (Tensile strength-Density-Proof Stress- Stress Strain Curve -Young's Modulus)
2. Compression test on wood
3. Double shear test on Steel
4. Torsion test on mild steel rod
5. Impact test on metal specimen
6. Hardness test on metals
7. Deflection test on Steel beam
8. Compression test on helical spring
9. Deflection test on carriage spring
10. Tests on bricks, concrete cubes and tiles - Demonstration only

**TOTAL: 30 hours**

### REFERENCE BOOKS

- R1:Punmia P.C, Ashok Kumar Jain, Arun Kumar Jain, "Mechanics of Material", Laxmi Publications,Reprint Edition, 2009.
- R2:Bansal R.K., "Strength of Materials", Laxmi Publications, New Delhi, Revised Fourth Edition,2010.
- R3:William A. Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series", TataMcGraw-Hill Publishing Co., New Delhi, 4th Edition, 2008.

### COURSE OUTCOME:

<b>CO1:</b>	Develop an understanding of the concepts of tension test on mild steel / tor steel rod and compression test on wood	<b>K3</b>
<b>CO2:</b>	Examine the concept of double shear test and torsion test on steel	<b>K3</b>
<b>CO3:</b>	Test for the impact and hardness of metal specimen	<b>K4</b>
<b>CO4:</b>	Examine the deflection properties of steel beam	<b>K4</b>
<b>CO5:</b>	Determine the stress by performing compression test on helical spring and also carriage spring	<b>K4</b>

## 22CMC036 HYDRAULICS LABORATORY

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### COURSE OBJECTIVES (Skill Development):

- To enable the student to explore the knowledge on components, function and uses of different types of pumps and turbine
- To study the measurement of velocity and discharge using weirs, notches, venturimeter and orifice meter



### Any Eight Experiments

1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Study of friction losses in pipes
6. Study of minor losses in pipes
7. Study on performance characteristics of Pelton turbine.
8. Study on performance characteristics of Francis turbine
9. Study on performance characteristics of Kaplan turbine
10. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
11. Study on performance characteristics of reciprocating pump.
12. Study on performance characteristics of Gear oil pump.
13. Study on performance characteristics of submersible pump.

**Total: 30 Hours**

### Text Books:

T1: Bansal.R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications Pvt. Ltd., New Delhi, 2013

T2: Subramanya.K " Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Private Limited, New Delhi, 2010.

T3: Rajput.R.K. "Fluid Mechanics", S.Chand and Co, New Delhi, 2008.

### Reference Books:

R1: Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2009.

R2: Jain.A.K., "Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, Twelfth Edition, 2016.

R3: Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw Hill, 2000.

### COURSE OUTCOMES

At the end of this course the students will be able to,

<b>CO1:</b>	Determine the coefficient of discharge in pipes through venturimeter and orifice meter	<b>K3</b>
<b>CO2:</b>	Determine the coefficient of discharge by rectangular and triangular notches	<b>K3</b>
<b>CO3:</b>	Determine the losses due to expansion, contraction and bends and losses in pipes	<b>K3</b>
<b>CO4:</b>	Analyze the performance characteristics of Pelton, Kaplan and Francis turbines	<b>K4</b>
<b>CO5:</b>	Analyze the efficiencies of centrifugal pump, reciprocating pump, Gear oil pump, submersible pump	<b>K4</b>

**COURSE OBJECTIVES (Skill Development):**

- To nurture and develop winning personalities and eventually leading them to become dynamic and socially responsible leaders

**UNIT I SOFT SKILLS I 6**

Introduction to Personality Development – Meaning–Features of personality – Dimensions of Personality Determinants of Personality–Features and Traits– Components of self concept– Barriers–Self analysis

**UNIT II SOFT SKILLS II 6**

Importance of Soft Skills – First impression–Work Place requirements–Discipline –Cleanliness Hygiene –general Appearance—Building Confidence—Concept of Thinking and Usage –Value of Time–Focus & Commitment.

**UNIT III SOFT SKILLS IN ACTION 6**

Grooming – Attire – Understanding others– Stability & Maturity Development – Strength s – Weakness – Opportunities–threats – Merits of SWOT Analysis – Components – how to convert weakness into strengths – Goal settings

**UNIT IV SELF AWARENESS AND SELF ESTEEM 6**

Definitions – Components of Self awareness – Developing Self awareness – Self esteem – meaning –Steps to improve self esteem.

**UNIT V SELF MOTIVATION 6**

Motivation – Meaning –Techniques of self motivation–Motivation & goal setting – Motivation and emotion – Motivation at work.

**TOTAL: 30 Hours****TEXT BOOKS:**

- T1: Personality Development And Soft Skills Barun K Mitra, Oxford Publication  
T2: Seven habits of Highly Effective people – Stephen R. Covey

**REFERENCE BOOKS:**

- R1: Emotion, motivation and Self regulation – Nathan C. Hall, McGill University, Canada  
Thomas Goetz, University of Konstanz, Germany  
<http://www.emeraldgroupublishing.com>.
- R2: Psychology of Self esteem – Nathaniel Branden, Nash (1st edition), Jossey – Bass (32 nd anniversary edition)

**WEBLINKS:**

- <https://www.educations.com/articles-and-advice/soft-skills-you-need-to-get-ahead-14193>

**COURSE OUTCOMES**

<b>CO1:</b>	Discuss the features, dimensions and determinants of personality	<b>K2</b>
<b>CO2:</b>	Make a good first impression in professional and other situations	<b>K3</b>
<b>CO3:</b>	Demonstrate confidence, punctuality and commitment as an engineer	<b>K3</b>
<b>CO4:</b>	Set goals for development using SWOT analysis	<b>K5</b>

22MCMC

**BASIC LIFE SKILLS**

L	T	P	Credits
2	0	0	0

**COURSE OBJECTIVE (Skill Development):**

- To provide value education to improve the students' character, understanding of principled life, physical health, maintaining youthfulness, measures and methods in five aspects of life.

**UNIT I****PHYSICAL HEALTH****6**

Manavalakalai (SKY) Yoga: Introduction - Education as a means for youth empowerment - Greatness of Education - Yoga for youth Empowerment. Simplified Physical Exercises: Hand, Leg, Breathing, Eye exercises - Kapalabathi, Makarasana Part I, Makarasana Part II, Body Massage, Acu pressure, Relaxation exercises - Benefits. Yogasanas: Pranamasana – Hastha Uttanasana - PadaHasthasana – AswaSanjalana Asana – Thuvipathaasva Sanjalana asana – Astanga Namaskara - Bhujangasana–AthaMukthaSavasana – AswaSanjalana Asana – Pada Hasthasana–Hastha Uttanasana - Pranamasana. Pranayama: Naddisuddi - Clearance Practice - Benefits.

**UNIT II****LIFE FORCE****6**

Reasons for Diseases - Natural reasons (Genetic / imprints, Planetary Position, Natural calamities and climatic changes) - Unnatural reasons (Food habits, Thoughts, Deeds). Philosophy of Kaya kalpa - Physical body - Sexual vital fluid - Life force -Bio-Magnetism - Mind. Maintaining youthfulness. Postponing old age - Transformation of food into seven components - Importance of sexual vital fluid Measure and method in five aspects of life - Controlling undue Passion. Kayakalpa practice - Aswini Mudra - Ojas breath - Benefits of Kaya Kalpa.

**UNIT III****MENTAL HEALTH****6**

Mental Frequencies - Beta, Apha, Theta and Delta wave - Agna Meditation explanation - benefits.

Shanthi Meditation explanation – Benefits - Thuriya Meditation explanation – Benefit. Benefits of Blessing - Self blessing (Auto suggestion) - Family blessing - Blessing the others - World blessing - Divine protection

**UNIT IV****VALUES****6**

Human Values Self-control - Self-confidence - Honesty Contentment - Humility – ModestyTolerance - Adjustment - Sacrifice – ForgivenessPurity (Body, Dress, Environment) - Physical purity - Mental purity - Spiritual puritySocialValues:Non-violence– ServicePatriotism – EqualityRespect for parents and elders - care and protection - Respect for teacher Punctuality - Time Management.

**UNIT V****MORALITY (VIRTUES)****6**

Importance of Introspection - I - Mine (Ego, Possessiveness). Six Evil Temperaments - Greed - Anger - Miserliness - Immoral sexual passion - Inferiority and superiority Complex – Vengeance. Maneuvering of Six Temperaments - Contentment - Tolerance - Charity - Chastity - Equality - Pardon (Forgiveness). Five essential Qualities acquired through Meditation: Perspicacity - Magnanimity - Receptivity - Adaptability – Creativity. Improved Memory Power - Success in the Examination.

**TOTAL: 30 Hours****TEXT BOOKS:**

- T1: Vethathiri Maharishi, 16th Edi.2013, Yoga for Modern Age, Vethathiri Publications, Erode.
- T2: Vethathiri Maharishi, 2014, Simplified Physical Exercises, Vethathiri Publications, Erode.
- T3: Vethathiri Maharishi, 3rd Edi.2014, Kayakalpam, Vethathiri Publications, Erode.
- T4: Rev.Dr.G.U. Pope, 2016, Thirukkural, Giri Trading Agency,
- T5: Vethathiri Maharishi, 1994, Mind, Vethathiri Publications, Erode.

#### REFERENCE BOOKS

- R1: Chandrasekaran.K, 1999, Sound Health through yoga, Sedapati, Tamilnadu, Premkalyan Publications.
- R2: Iyengar, B.K.S. 2008, Light on Yoga, Noida, UP India, Harber Collins Publishing India Ltd.,
- R3: K. R. Dhanalakshmi and N. S. Raghunathan, “ Personality Enrichment, Margham Publications
- R4: D.r V. M. Selvaraj, “Personality Development” Bhavani Publications
- R5: R. S. Agarwal, “Quantitative Aptitude”.
- R6: A.K Gupta, “Logical and Analytical Reasoning (English)”, 30th Edition.

#### COURSE OUTCOME:

At the end of this course the students will be able to,

<b>CO1:</b>	Utilize skills developed through participation in Manavalakalai (SKY) Yoga to help maintain lifelong health and fitness	<b>K3</b>
<b>CO2:</b>	Demonstrate foundational standing, sitting, balance postures with proper alignment and Maintain youthfulness through kaya kalpa practice	<b>K2</b>
<b>CO3:</b>	Explore relaxation techniques to observe thoughts and to manage emotions and stress, and reflect on those techniques which are most effective to them	<b>K3</b>
<b>CO4:</b>	Demonstrate an understanding of anatomy and physiology as it applies to the intentional integration of breath, postures, and movement within the practice of yoga to understand the human values	<b>K2</b>
<b>CO5:</b>	Achieve a greater sense of awareness, wisdom, introspection, and a deeper sense of relaxation through meditation to keep up morality in life	<b>K3</b>

## SEMESTER -IV

<b>22CMC04</b>	<b>BIOLOGY FOR ENGINEERS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

### **MODULE 1. (2 HOURS)- INTRODUCTION**

Purpose: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry. Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry

### **MODULE 2. (3 HOURS)- CLASSIFICATION**

Purpose: To convey that classification per se is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted. Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotrophs (d) Ammonia excretion – aminotelic, uricotelic, ureotelic (e) Habitata- aquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus

### **MODULE 3. (4 HOURS)-GENETICS**

Purpose: To convey that “Genetics is to biology what Newton’s laws are to Physical Sciences” Mendel’s laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics.

### **Module 4. (4 Hours)-Biomolecules**

Purpose: To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.

<b>22CMC042</b>	<b>SURVEYING &amp; GEOMATICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **Course Objectives**

- Develop the rudiments of surveying and geodetic principles to Geoinformatics Engineers, List the various methods of plane and geodetic surveying to solve the real world ,

problems, Explain the concepts of Control Surveying, Explain the basics of Astronomical Surveying, Categorize the working of modern surveying equipment and solve the surveying problems.

### **UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING 9**

Classifications and basic principles of surveying – Chain survey – Basic principles and applications of Plane Table and Compass - Levels and staves - Methods of levelling - Booking - Reduction - Curvature and refraction - Contouring.

### **UNIT II THEODOLITE SURVEYING 9**

Horizontal and vertical angle measurements - Temporary and permanent adjustments – Heights and distances–Tachometric surveying – Trigonometric levelling – Horizontal curves in route surveying – classification, functions and requirements - methods of setting out simple curves.

### **UNIT III CONTROL SURVEYING AND ADJUSTMENT 9**

Horizontal and vertical control- Methods - Triangulation- Base line - Instruments and accessories – Corrections - Satellite station - Traversing. Concepts of measurements and errors – Photogrammetry Surveying –Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping.

### **UNIT IV MODERN FIELD SURVEYING 9**

Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments – Distomat – Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

### **UNIT V REMOTE SENSING 9**

Introduction –Electromagnetic Spectrum– interaction of electromagnetic radiation with the atmosphere and earth surface – remote sensing data acquisition – platforms and sensors – visual image interpretation – digital image processing.

**Total: 45 Hours**

#### **TEXT BOOKS:**

- T1: T.P. Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi GrihaPrakashan, Pune, 2008.
- T2: Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I& II, Lakshmi Publications Pvt Ltd, New Delhi, 2005.
- T3: S.S.Bhavikatti, Surveying Theory and Practice, I.K.International Publishing House Pvt. Ltd, New Delhi, 2010.
- T4: Satheesh Gopi, rasathishkumar, Nmadhu, “ Advanced Surveying , Total Station GPS and Remote Sensing “ Pearson education , 2007

#### **REFERENCE BOOKS:**

- R1: R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
- R2: S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice‘ Hall of India 2004 5. K.R. Arora, Surveying Vol I & II, Standard Book house , Twelfth Edition. 2013
- R3: Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
- R4: Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998.

## Web Links

1. <https://www.youtube.com/watch?v=TqbYIHizYJs&list=PLwdnzlV3ogoXXrcA8w6rrYmXfq3uU4R7g>
2. [https://onlinecourses.nptel.ac.in/noc20\\_ce16/preview](https://onlinecourses.nptel.ac.in/noc20_ce16/preview)
3. [https://books.google.co.in/books/about/Higher\\_Surveying.html?id=aLhW8Eq2W2sC](https://books.google.co.in/books/about/Higher_Surveying.html?id=aLhW8Eq2W2sC)

## COURSE OUTCOMES

<b>CO1:</b>	Acquire the fundamental knowledge and concepts of surveying techniques.	<b>K2</b>
<b>CO2:</b>	Apply the skills of basic surveying measurement.	<b>K3</b>
<b>CO3:</b>	Understand the behavior of infrastructural development project.	<b>K2</b>
<b>CO4:</b>	Understand the impacts of landcover on engineering project.	<b>K2</b>
<b>CO5:</b>	Differentiate the concepts of Higher surveying and geomatics.	<b>K4</b>

		<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>22CMC043</b>	<b>MECHANICS OF MATERIALS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

## COURSE OBJECTIVE: (Employability)

At the end of the course, the students will be able

- To learn the computation of deflection of beams and trusses using energy principles,
- Analysis of indeterminate beams and columns, state of stress in three dimensions
- Advanced topics in the bending of beams with the stress distribution in thin and thick cylinders.

## UNIT I ENERGY PRINCIPLES

**9**

Generalized state of stress and strain tensor, Yield criteria and theories of failure; Tresca, Von-Mises, Hill criteria, Heigh-Westerguard's stress space. Strain Energy and Strain Energy Density – Strain Energy in Traction, Shear in Flexure and Torsion –Castigliano's Theorems – Principle of Virtual Work Application of Energy Theorems for Computing Deflections in Beams and Trusses – Maxwell's Reciprocal Theorems

## UNIT II TRANSVERSE LOADING ON BEAMS

**9**

Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading – relationship between bending moment and shear force – bending moment, shear force diagram for simply supported, cantilever and overhanging beams – Theory of simple bending – analysis of stresses - proportioning of sections

## UNIT III DEFLECTION OF BEAMS

**9**

Types of Beams- Deflection of beams – Deflection of beams by double integration method – Deflection of beams by Macaulay's method – Slope and deflection using moment area method, Slope and deflection using Conjugate Beam method for various loading conditions.

## UNIT IV INDETERMINATE BEAMS

**9**

Propped Cantilever beam Reactions due to lateral loads shear force & bending moment and Fixed Beams Reactions due to lateral loads shear force & bending moment - Fixed End Moments and Reactions due to lateral loads Theorem of Three Moments – Analysis of Continuous Beams (limited two unknowns).

**UNIT V COLUMNS****9**

Eccentrically Loaded Short Columns – Middle Third Rule – Core Section – Columns of Unsymmetrical Sections – Euler’s Theory of Long Columns – Critical Loads for Prismatic Columns with Different End Conditions; Rankine-Gordon Formula for Eccentrically Loaded Columns.

**TOTAL: 45 hours****TEXT BOOKS:**

- T1: Rajput R.K, “Strength of Materials”, S.Chand& Company Ltd., New Delhi, 2014.  
 T2: Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain, “Mechanics of Material”, Laxmi Publications, Reprint 10th Edition, 2009.

**REFERENCE BOOKS:**

- R1: William A.Nash, “Theory and Problems of Strength of Materials, Schaum’s Outline Series”, Tata McGraw-Hill Publishing Co., New Delhi, 4th Edition, 2008.  
 R2: Srinath L.S, “Advanced Mechanics of Solids”, Tata McGraw-Hill Publishing Co., New Delhi, 3<sup>rd</sup> Edition, 2009.  
 R3: Egor P Popov, “Engineering Mechanics of Solids”, Prentice Hall of India, New Delhi, 2<sup>nd</sup> Edition, 2003.  
 R4: Kazimi S.M.A, “Solid Mechanics”, Tata McGraw-Hill Publishing Co., New Delhi, 2003.  
 R5: Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004

**WEBLINKS:**

1. <https://nptel.ac.in/courses/105106172>
2. <https://nptel.ac.in/courses/105106049>

**COURSE OUTCOME**

**At the end of the course, the students will be able to**

<b>CO 1</b>	Interpret the energy principles, their use in the analysis of structures	<b>K2</b>
<b>CO 2</b>	Draw the SFD and BMD for various types of beams	<b>K3</b>
<b>CO 3</b>	Determine the deflection of beams by various methods	<b>K4</b>
<b>CO 4</b>	Analyze the moments and reactions in indeterminate beams	<b>K4</b>
<b>CO 5</b>	Solve the analytic methods used in connection with the structural design of columns, long mechanical members under compression	<b>K3</b>

	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>22CMC044 DISASTER PREPAREDNESS &amp; PLANNING</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

**COURSE OBJECTIVE: (Employability)**

At the end of the course, the students will be able

- To identify the various types of disaster and its management process.
- To understand the importance of the mitigation and other agencies.

**UNIT I INTRODUCTION****4**

Introduction - Concepts and definitions: disaster, hazard, vulnerability, risk-severity, frequency and details, capacity, impact, prevention, mitigation).

**UNIT II TYPES OF DISASTERS****8**

Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India,





**COURSE OBJECTIVE: (Employability)**

- To give exposure to planning of roadways and to develop skills on planning and design of flexible and rigid pavements
- To give exposure on materials used for highways and construction procedures. To have basic knowledge on pavement evaluation

**UNIT I HIGHWAY PLANNING AND ALIGNMENT 9**

Highway Development in India - Jayakar Committee Recommendations and Realisations, - Indian Roads Congress, Highway Research Board, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment, Engineering Surveys for Alignment - Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards].

**UNIT II GEOMETRIC DESIGN OF HIGHWAYS 9**

Design of Horizontal Alignment – Horizontal Curves, Super elevation, Widening of Pavements on Horizontal Curves and Transition Curves, Design of Vertical Alignments – Summit and Valley Curves-Sight Distances - Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections [Problems in SSD and OSD].

**UNIT III FLEXIBLE, RIGID PAVEMENTS AND THEIR CONSTRUCTION PRACTICE 9**

Rigid and Flexible Pavements- Components and their Functions -Design Principles of Flexible and Rigid Pavements - Design Practice for Flexible Pavements [IRC Method and Recommendations- Problems] - Design Practice for Rigid Pavements – IRC Recommendations - concepts only. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]

**UNIT IV HIGHWAY MATERIALS 9**

Desirable Properties and Testing of Highway Materials: Soil – California Bearing Ratio Test, Field Density Test - Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value test - Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening point Tests.

**UNIT V HIGHWAY MAINTENANCE 9**

Types of defects in Flexible pavements – Surface defects, Cracks, Deformation, Disintegration, Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks Spalling of Joints and Mud Pumping – and Special Repairs. - Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method [Procedure only].

**TOTAL: 45 Hours****TEXT BOOKS:**

- T1: Khanna S K, Justo C E G and A.Veeraraghavan, “Highway Engineering”, Khanna Publishers, Roorkee, 10<sup>th</sup> edition, 2015.
- T2: Kadiyali L R, “Principles and Practice of Highway Engineering”, Khanna Technical Publications, Delhi, 2012.

## REFERENCE BOOKS:

- R1: C.S. Papacostas, P.D. Prevedouros, "Transportation Engineering & Planning", Prentice Hall of India Pvt Ltd, 2006.  
R2: IRC Standards (IRC 37 - 2001 & IRC 58 - 1998)  
R3: Bureau of Indian Standards (BIS) Publications on Highway Materials

Weblink:

1. <https://www.crridom.gov.in/>
2. <https://nptel.ac.in/courses/105105107>
3. <https://nptel.ac.in/courses/105101087>

## COURSE OUTCOME

At the end of the course, the students will be able to

CO 1	Outline a highway with Highway Cross Sectional Elements	K2
CO 2	Apply the sight distance and superelevation concepts in horizontal and vertical alignment of roads	K3
CO 3	Design a flexible pavement as per IRC guideline	K3
CO 4	Interpret the results of highway materials and develop a procedure for pavement construction	K2
CO 5	Identify the causes of pavement failures and suggest a remedial measure	K2

	L	T	P	Credits
<b>22CMV046 ENGINEERING GEOLOGY</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>

### Course Objectives

- To understand the importance of geological knowledge such as structure of the earth, earthquake, and volcanoes.
- To apply these fundamental knowledge in Civil engineering projects such as dams, tunnels, bridges, roads, airport and harbor

### UNIT I PHYSICAL GEOLOGY 9

Geology in civil engineering – branches of geology – structure of earth and its composition weathering of rocks – scale of weathering – soils – landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India

### UNIT II MINEROLOGY 9

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene – hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.

### UNIT III PETROLOGY 9

Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

### UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS 9

Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.

## UNIT V APPLICATION OF GEOLOGICAL INVESTIGATIONS 9

Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings – Hydrogeological investigations and mining – Coastal protection structures. Investigation of Landslides, causes and mitigation. Major geological hazards Geological considerations in design of constructed facilities and infrastructure.

### List of Exercises

- Identification of type of rock
- Identification of type of mineral
- Geophysical exploration
- Fly levelling and economic section for a road

**TOTAL: 45 +15 Hours**

### Text Books:

- T1: Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012A text book of waves and oscillations, BrijLal and N. Subrahmanyam, Vikas Publishing, New Delhi.
- T2: Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt,
- T3: Parbin Singh. A “Text book of Engineering and General Geology”,Katson publishing house, Ludhiana 2009.
- T4: ChennaKesavulu N. “Textbook of Engineering Geology”, Macmillan India Ltd., 2009
- T5: Gokhale KVGK, “Principles of Engineering Geology”, B.S. Publications, Hyderabad 2011.

### Reference Books:

- R1: Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010
- R2: Bell .F.G. “Fundamentals of Engineering Geology”, B.S. Publications. Hyderabad 2011.
- R3: Dobrin, M.B “An introduction to geophysical prospecting”, McGraw Hill, New Delhi, 1988.

### Web Links:

1. <https://nptel.ac.in/courses/105105106>
2. <https://nptel.ac.in/courses/105104191>
3. [https://onlinecourses.swayam2.ac.in/cec19\\_mm02/preview](https://onlinecourses.swayam2.ac.in/cec19_mm02/preview)

### COURSE OUTCOMES

At the end of this course the students will be able to,

<b>CO 1</b>	Understand the physical geology of the earth and analyse its scope, relevance in civil engineering	<b>K2</b>
<b>CO 2</b>	Identify the different minerals based on their property	<b>K2</b>
<b>CO 3</b>	Associate the use of different kinds, distribution of rocks based on their property and their uses in civil engineering	<b>K2</b>
<b>CO 4</b>	Understand the different geological structures and to identify and choose the various geophysical investigations	<b>K2</b>
<b>CO 5</b>	Understand and identify the Geological conditions necessary for design and construction of large infrastructure	<b>K2</b>

		L	T	P	Credits
<b>22CMV047</b>	<b>COMPUTER AIDED CIVIL ENGINEERING DRAWING LABORATORY</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**COURSE OBJECTIVE: (Skill Development)**

At the end of the course, the students will be able

- To introduce drafting the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.
- To get knowledge about Computer Aided Drawing software.

**LIST OF EXERCISES**

1. Drawing of a plan, elevation and cross section for Fully Paneled Door
2. Drawing of a plan, elevation and cross section for Glazed and Paneled door
3. Drawing of a plan, elevation and cross section for Fully Paneled window
4. Drawing of a plan, elevation and cross section for Glazed and Paneled window
5. Drawing of a plan, elevation and cross section for different types of Brick Bonds
6. Drawing of a plan, elevation and cross section for different types of Stair Case
7. Drawing of a Roof Truss – King Post
8. Drawing of a Roof Truss – Queen Post
9. Drawing of a Steel Simple Roof Truss
10. Drawing of a plan, elevation and cross section for Residential Building – I
11. Drawing of a plan, elevation and cross section for Residential Building – II
12. Drawing of a plan, elevation and cross section for Office Building

**TOTAL: 30 hours**

**TEXT BOOKS:**

T1: Dhananjay A. Jolhe, “Engineering Drawing with an Introduction to AutoCAD”, Tata McGraw Hill Publishing Company Limited, 1st Edition, 2008.

**REFERENCE BOOKS:**

R1: Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, “Building Construction”, Laxmi publications Pvt. Ltd., 10th Edition, Latest reprint 2014.

**COURSE OUTCOMES:**

<b>CO 1</b>	Draw the plan, section and elevation of a door and window	<b>K3</b>
<b>CO 2</b>	Create, analyze and produce 2D drawings of buildings in AUTO CAD environment	<b>K6</b>
<b>CO 3</b>	Develop knowledge on drawing of different trusses	<b>K3</b>
<b>CO 4</b>	Model the different components of a building	<b>K6</b>
<b>CO 5</b>	Model a drawing plan, an elevation and a cross-section of residential buildings	<b>K6</b>

		L	T	P	Credits
<b>22CMV048</b>	<b>MODERN SURVEYING LABORATORY</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**COURSE OBJECTIVE: (Skill Development)**

- To familiarize with the various surveying instruments like Chain, Plane Table, Dumpy level, Theodolite and Total Station
- To know about the various techniques of chaining, leveling, traversing, contouring etc... and its practical applications in the field of civil engineering

## LIST OF EXPERIMENTS

1. Chain Traversing
2. Compass Traversing
3. Fly leveling using Dumpy level & Check leveling
4. Measurement of horizontal angles and vertical angles by reiteration method
5. Measurement of horizontal angles and vertical angles by repetition method
6. Theodolite survey traverse
7. Heights and distances - Triangulation - Single plane method.
8. Setting out works - Foundation marking
9. Setting out works - Simple curve (right/left-handed) - Transition curve.
10. Field observation for and Calculation of azimuth
11. Field work using Total Station.
12. Longitudinal Section (LS) and Cross Section (CS)

**TOTAL: 30 Hours**

## REFERENCE BOOKS:

- R1: Kanetkar T.P., "Surveying and Leveling", Vols. I and II, United Book Corporation, Pune, 2010.
- R2: Punmia B.C., "Surveying", Vols. I, Laxmi Publications, 16<sup>th</sup> Edition, 2005
- R3: Clark D., "Plane and Geodetic Surveying", Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 2001.

## COURSE OUTCOMES

<b>CO 1</b>	Conduct survey and gather field data	<b>K3</b>
<b>CO 2</b>	Develop field notes from survey data	<b>K3</b>
<b>CO 3</b>	Infer from survey data and compute areas and volumes	<b>K3</b>
<b>CO 4</b>	Setting out a curve by applying the principles of surveying	<b>K6</b>
<b>CO 5</b>	Determine the LS and CS of a road	<b>K3</b>

<b>22EPD102</b>	<b>PERSONALITY DEVELOPMENT II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

**UNIT I                      SOFT SKILLS                      III                      6**  
Basic Etiquette – Email etiquette – Business etiquette – Telephone etiquette – Meeting etiquette – Adjustment of Role & Leadership – Team Management & Development

**UNIT II                      QUANTITATIVE APTITUDE I                      6**  
Percentage – Profit Loss – Discount – Ratio Proportion – Time & Work – Time, Speed & Distance. Problems relating to ages – Permutation & Combination – Probability

**UNIT III                      QUANTITATIVE APTITUDE II                      6**  
Mensuration – Clocks and Calendars – Boats – Simple Interest – Compound Interest – Fractions and Decimals – Square roots – Functions.

**UNIT IV                      ANALYTICAL PROBLEMS                      6**  
Introduction – Linear Sequencing – Seating Arrangements – Distribution/Double Line Up – Selection – Ordering and Sequencing – Binary Logic – Venn Diagrams – Directions.

**UNIT V                      LOGICAL PROBLEMS                      6**

**TEXT BOOKS:**

- T1. K. R. Dhanalakshmi and N S Raghunathan, Personality Enrichment, Margham Publications, 2012  
 T2. R. S. Agarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publishers, 2017

**REFERENCE BOOKS:**

- R1. D. P. Sabharwal, Personality Development Handbook, Fingerprint publishing, 2021  
 R2. A.K Gupta, Logical and Analytical Reasoning (English), Ramesh Publishing House, 2022

**WEBLINKS:**

1. <https://www.talentlyft.com/en/resources/what-is-aptitude-and-ability-tests>
2. <https://www.zippia.com/advice/logical-thinking-skills/>
3. <https://www.cleverism.com/skills-and-tools/logical-thinking/>

**COURSE OUTCOMES**

<b>CO1:</b>	Discuss the basic, email, business, telephone and meeting etiquettes.	<b>K2</b>
<b>CO2:</b>	Solve problems on ratio proportion related to profit and loss, discounts, time and work, Time, speed and distance.	<b>K3</b>
<b>CO3:</b>	Work with fractions, decimals and square roots.	<b>K3</b>
<b>CO4:</b>	Analyze the cause, effect and course of action in logical problems.	<b>K4</b>
<b>CO5:</b>	Solve problems on the letter and symbol series.	<b>K3</b>

**22CMC049 ENVIRONMENTAL SCIENCE AND ENGINEERING**

L	T	P	C
3	0	0	3

**Course Objectives**

- At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future
- To provide understanding of component of environment, their function ,quality, issues related to environment ,effect of quality degradation on human beings and their solutions

**UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 9**

Definition – Scope and importance – Need for public awareness – Concepts of an Ecosystem – Structure and Function of an Ecosystem –Producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Ecological Succession – Food Chains, Food Webs and Ecological Pyramids – Introduction, Types, Characteristic Features, Structure and Function of the (A) Forest Ecosystem (B) Grassland Ecosystem (C) Desert Ecosystem (D) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries) – Introduction to Biodiversity – Definition: Genetic, Species and Ecosystem Diversity – Bio-geographical Classification of India – Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values – Biodiversity at Global, National and Local Levels – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-

Wildlife Conflicts – endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ conservation of Biodiversity. Field Study of Common Plants, Insects and Birds.

Field study of simple ecosystems - pond, river, hill slopes, etc.

## **UNIT II ENVIRONMENTAL POLLUTION 9**

Definition – Causes, Effects and Control Measures of (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Solid Waste Management:- Causes, Effects and Control Measures of municipal solid Wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – disaster Management - Floods, Earthquake, Cyclone and Landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

## **UNIT III NATURAL RESOURCES 9**

Forest resources -Use and over – Exploitation – Deforestation – Case studies – Timber extraction –Mining – Dams and their ground water – Floods – Drought – Conflicts over water –Dams – Benefits and Problems – Mineral Resources- Use and Exploitation, Environmental Effects of Extracting and Using Mineral Resources, Case Studies – Food Resources: World Food Problems, Changes caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer-Pesticide Problems, Water Logging, salinity, Case Studies – Energy Resources:- Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources, Case Studies – Land Resources - Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of an Individual in Conservation of Natural Resources – Equitable use of Resources for Sustainable Lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

## **UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9**

From Unsustainable To Sustainable Development – Urban Problems Related to energy – Water conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of People, its Problems and Concerns, Case Studies Role of non – governmental organization - Environmental Ethics- Issues and Possible Solutions – Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust, Case Studies –Wasteland Reclamation – Consumerism and Waste Products – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act –enforcement machinery involved in environmental Legislation – Central and state pollution control boards - Public Awareness.

## **UNIT V HUMAN POPULATION AND THE ENVIRONMENT 9**

Population Growth, Variation among Nations – Population Explosion Family Welfare Programme – environment and Human Health – Human Rights –Value Education – HIV /AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health – Case Studies.

**TOTAL: 45 Hours**

### **Text Books:**

T1: Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).

T2: Benny Joseph, 'Environmental Science and Engineering', Tata McGraw- Hill, New Delhi, (2006).

### **Reference Books**

R1: R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.

R2: Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.



R3:Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.

R4:Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)

### Web Links:

1. [https://onlinecourses.nptel.ac.in/noc20\\_ge16/preview](https://onlinecourses.nptel.ac.in/noc20_ge16/preview)
2. <https://ggn.dronacharya.info/APSDept/Downloads/QuestionBank/ENVIRONMENTAL-STUDIES/NPTEL-Link.pdf>
3. <http://eagri.org/eagri50/ENVS302/pdf/lec14.pdf>
4. [https://onlinecourses.nptel.ac.in/noc19\\_ge22/preview](https://onlinecourses.nptel.ac.in/noc19_ge22/preview)

### COURSE OUTCOMES

At the end of this course the students will be able to,

<b>CO 1</b>	Understand the core concepts, methods of ecological and physical sciences, their application in environmental problem-solving	<b>K2</b>
<b>CO 2</b>	Apply system concepts and methodologies to analyse, understand the interactions between social and environmental processes	<b>K3</b>
<b>CO 3</b>	Apply the ethical, cross-cultural, and historical context of environmental issues and the link between human and natural systems	<b>K3</b>
<b>CO 4</b>	Develop the understanding based on the observations and illustration, drawn from the experiences of physical, biological, social and cultural aspects of life, rather than abstractions	<b>K3</b>
<b>CO 5</b>	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world	<b>K2</b>

### 22MCMC41 GENDER INSTITUTION AND SOCIETY

L	T	P	C
2	0	0	2

### Course Objective:

- The course helps the student to understand concepts of social justice and gender justice. It provides the student with the knowledge of various institutions functioning worldwide which aim to eradicate discrimination against women.
- The course further aids students in understanding feminism and gender in relation to the society and to study the basic constitutional remedies available to women.

### UNIT – I

6

Social Justice and Gender Justice – Theories relating to Social Justice – Theories relating to Gender Justice – Interrelationship between Gender justice and Social Justice

### UNIT – II

6

International Conventions for protection of Women – Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) – National Commission for women – Constitutional remedies available for women under Indian Constitution.

### UNIT – III

6

United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) - Association for Women's Rights in Development (AWID) –Women kind worldwide – Centre for reproductive rights - Women's Environment and Development Organization (WEDO) - Global Fund for Women

### UNIT – IV

6

International Center for Research on Women (ICRW) - European Institute for Gender Equality (EIGE) – Promundo - International Alliance of Women (IAW) - International Women's Development Agency (IWDA).

**TEXT BOOKS**

T1: Law relating to Women and children, Mamta Rao

T2: Gender, Politics and Institutions: Towards a Feminist Institutionalism, by Mona Lena Krook and Fiano Mackay, 2010

T3: Gender Justice and Feminist Jurisprudence, Dr. Sheetal Kanwal, 2015

T4: Narain's Gender and society, P. Jain

**REFERENCE BOOKS**

R1: Gender Justice and feminist Jurisprudence by Dr. Ishitha Chatterjee

R2: Gender and Institutions, Moira Gatens and Alison Mackinnon

**SUGGESTED READINGS:**

1. Women and Gender : Society and Community , Siddhartha Sarkar

**COURSE OUTCOMES:**

After the completion of this Course, the student would be able to:

<b>CO1:</b>	Understand the Concept of Social Justice and Gender Justice.	<b>K2</b>
<b>CO2:</b>	Learning the International Conventions and constitutional remedies available for women.	<b>K2</b>
<b>CO3:</b>	Identify the various gender Institutions and its functions for the development of women	<b>K2</b>
<b>CO4:</b>	Assessing the International agencies.	<b>K3</b>
<b>CO5:</b>	Summarising the study on feminism and relation of gender and society.	<b>K3</b>

<b>CMC051</b>	<b>SEMESTER –V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>GEOTECHNICAL ENGINEERING</b>				
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **Course Objectives**

At the end of the course, the students will be able

- To specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground;
- Understand various site investigation techniques and their in-situ applications;
- Prepare a soil investigation report based on borehole log data and various in-situ tests like SPT, CPT etc.,

### **UNIT I INTRODUCTION & PLASTICITY CHARACTERISTICS OF SOIL 12**

Origin, Nature and type of Soils, its formation and deposition – Phase system in terms of weight, volume, void ratio and porosity-Basic Definition and Relationship - Sieve analysis - Sedimentation Analysis – Determination of various parameters: Moisture content, Unit Weight, Specific Gravity, Consistency limits and Indices– Soil Classification for Engineering purposes – Particle size Classification, Textural classification, Unified soil Classification and Indian Standard Classification System – Field Identification of soils- Clay Minerals

### **UNIT II PERMEABILITY AND EFFECTIVE STRESS PRINCIPLES 12**

Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction - Effective stress concepts in soil – Total, Neutral and Effective stress distribution in soil in effect of Water table - Permeability – Darcy’s Law, Permeability measurement in the laboratory and Field methods- Factors affecting permeability – Quick sand condition – Seepage Analysis – Laplace Equation - Introduction to flow nets –Properties and uses - Application to simple problems.

### **UNIT III STRESS DISTRIBUTION & COMPACTION 12**

Stress distribution in soil media – Boussinesq’s formula – stress due to point load, line load and strip load, uniformly loaded circular and rectangular loaded area – Newmark’s Influence charts – Westergaard equation for point load- Contact pressure under rigid and flexible area – Theory of compaction- Laboratory Determination of Optimum moisture content and maximum dry density- Factors affecting compaction

### **UNIT IV SHEAR STRENGTH & CONSOLIDATION 12**

Introduction on Consolidation- Comparison of Compaction and Consolidation- Components of settlement-Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test- Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand

### **UNIT V SLOPE STABILITY 12**

Types of Slopes and Slope failure mechanisms- Analysis of Finite and Infinite Slopes - Swedish Circle Method- Friction circle method - stability number – problems – Slope protection measures

**TOTAL: 60 hours**

### **Text Books:**

T1: Punmia P.C., “Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd., 16th Edition, New Delhi, 2005.

T2: Venkatramaiah, C. “Geotechnical Engineering”, New Age International Publishers, New

**Reference Books:**

- R1: McCarthy D.F., “Essentials of Soil Mechanics and Foundations Basic Geotechniques”, Sixth Edition, Prentice-Hall, New Jersey, 2002.  
 R2: Das, B.M, “Principles of Geotechnical Engineering”, (fifth edition), Thomas Books, 2005  
 R3: Muni Budhu, “Soil Mechanics and Foundations”, John Willey & Sons, Inc, New York, 2008.

**Web Links:**

1. <https://nptel.ac.in/courses/105105168>
2. <https://nptel.ac.in/courses/105103207>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Understand the site soil condition by classifying and identifying the index properties of soil	<b>K2</b>
<b>CO 2</b>	Determine and calculate the effective permeability and plot stress distribution diagram of soil mass	<b>K3</b>
<b>CO 3</b>	Determine the comparative effort and compute the vertical stress in a semi-infinite soil mass	<b>K3</b>
<b>CO 4</b>	Evaluate ground settlements against time and stiffness of soil using shear strength parameters	<b>K5</b>
<b>CO 5</b>	Evaluate factor of safety of infinite slopes and to prepare a soil investigation based on borehole log data	<b>K5</b>

<b>22CMC052</b>	<b>STRUCTURAL ANALYSIS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**COURSE OBJECTIVE: (Employability)**

- Analyze the structure / frame for various scenarios
- Understand various different analysis methods

**UNIT I SLOPE DEFLECTION METHOD 12**

Slope deflection equations- Analysis of continuous beams and Analysis of rigid frames with sway and Analysis of rigid frames without sway - Symmetry of rigid frames and anti symmetry of rigid frames – Simplification for hinged end - Support settlements of rigid frames.

**UNIT II MOMENT DISTRIBUTION METHOD 12**

Stiffness and carry over factors – Distribution and carryover of bending moments - Analysis of continuous Beams by moment distribution method - Analysis of rigid frames with sway by moment distribution method - Analysis of rigid frames without sway by moment distribution method - Plane rigid frames with and without sway.

**UNIT III MOVING LOADS AND INFLUENCE LINES 12**

Influence lines for reactions in statically determinate structures – influence lines for member forces in pin jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads. Rolling loads – Influence line diagram - Influence lines for reactions- Influence lines for shear force and bending moment - Muller Breslau’s principle – Application of Muller Breslau’s principle to determinate beams and Application of Muller Breslau’s principle continuous beams.

**UNIT IV ARCHES****12**

Arches structural forms – Examples of arch structures – Types of arches – Analysis of three hinged parabolic arch- for various loads, Analysis of three hinged circular arch for various loads, Analysis of two hinged parabolic arches for various load conditions and Analysis of two hinged circular arches for various load conditions , fixed arches parabolic and circular arches – Settlement and temperature effects

**UNIT V SUSPENSION BRIDGES AND SPACE TRUSSES****12**

Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders. Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

**TOTAL: 60 h****TEXT BOOKS:**

- T1: Vaidyanathan.R, Perumal.P, “Structural Analysis-I,II”, Laxmi Publications, Fourth Edition,2008  
 T2: Bhavikatti, S S., “Structural Analysis”, Vol.1 and 2, Vikas Publishing House Pvt Ltd., New Delhi-4, 2011.  
 T3: B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, “Theory of structures” , Laxmi Publications, New Delhi, 12<sup>th</sup> Edition,2004.

**REFERENCE BOOKS:**

- R1: William Weaver, Jr & James M.Gere, “Matrix analysis of framed structures”, CBS Publishers & Distributors, Delhi, 2005  
 R2: Ashok K.Jain, “Advanced Structural Analysis”, Nem Chand & Sons, 2008  
 R3: Vaidyanathan.R, Perumal.P, “Structural Analysis-I”, Laxmi publications, Fourth edition, 2008  
 R4: Pandit G.S. and Gupta S.P., “Structural Analysis – A Matrix Approach”, Tata McGraw Hill Publishing Company Ltd., 2008.

**WEBLINK:**

- <https://nptel.ac.in/courses/105105166>
- <https://nptel.ac.in/courses/105101085>

**COURSE OUTCOME:****At the end of the course, the student will be able to**

<b>CO 1</b>	Sketch the influence line for shear force, bending moment and member forces in statically indeterminate structure	<b>K3</b>
<b>CO 2</b>	Analyze the different types of Arches	<b>K4</b>
<b>CO 3</b>	Analyze the suspension bridges	<b>K4</b>
<b>CO 4</b>	Analyze the continuous beam and frame structure by slope deflection method	<b>K4</b>
<b>CO 5</b>	Analyze the continuous beam and frame structure by moment distribution method	<b>K4</b>

	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>22CMC053 CONSTRUCTION ENGINEERING &amp; MANAGEMENT</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**COURSE OBJECTIVE: (Employability)**

At the end of the course, the students will be able

- To ability to plan, control and monitor construction projects.
- To understand the logic behind the network diagram.
- To understand the important of construction Management

## **UNIT I INTRODUCTION**

**5**

Basics of Construction- Unique features of construction, construction projects types and features, phases of a project, agencies involved and their methods of execution.

## **UNIT II MANAGEMENT TECHNIQUES**

**12**

Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts. Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion.

## **UNIT III CONSTRUCTION METHODS**

**9**

Types of foundations and construction methods; Basics of Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with block work walls; Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures; Basics of construction methods for Bridges.

## **UNIT IV CONSTRUCTION EQUIPMENT**

**9**

Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities- Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site

## **UNIT V CONTRACTS MANAGEMENT**

**9**

Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to precede, rights and duties of various parties, notices to be given, Contract Duration and Price. Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination

### **List of Exercises**

1. Draw a Bar Chart and Gantt Chart for an activity and state the inference of the comparison
2. Create a work break-down structure for construction of foundation
3. Create a work break-down structure for construction of roof
4. Evaluate the total duration of an activity using CPM
5. Determine the shortest time for an activity using PERT
6. Determine slack, float and earliest time of completion using PERT analysis

**TOTAL: 45+15 hours**

### **TEXT BOOKS:**

- T1: Varghese, P.C., "Building Construction", Prentice Hall India, 2007.  
T2: National Building Code, Bureau of Indian Standards, New Delhi, 2017.  
T3: Chudley, R., "Construction Technology", ELBS Publishers, 2007.  
T4: Peurifoy, R.L. "Construction Planning, Methods and Equipment", McGraw Hill, 2011

### **REFERENCE BOOKS:**

- R1: Nunnally, S.W. "Construction Methods and Management", Prentice Hall, 2006

R2: Jha, Kumar Neeraj., “Construction Project management, Theory & Practice”, Pearson Education India, 2015

R3: Punmia, B.C., Khandelwal, K.K., “Project Planning with PERT and CPM”, Laxmi Publications, 2016.

#### WEBLINKS:

1. <https://nptel.ac.in/courses/105104161>
2. <https://nptel.ac.in/courses/105103093>
3. <https://nptel.ac.in/courses/105102088>

#### COURSE OUTCOMES:

**At the end of the course, the student will be able to**

<b>CO 1</b>	Compare the different types of chart and select the optimum one	<b>K3</b>
<b>CO 2</b>	Develop the scheduling activity path for a construction using PERT	<b>K6</b>
<b>CO 3</b>	Understand the different construction methods by comparing their merits	<b>K2</b>
<b>CO 4</b>	Make use of the various construction equipment for varying construction operations	<b>K3</b>
<b>CO 5</b>	Relate to the knowledge on contracts to find the performance parameters of a contract	<b>K2</b>

<b>22CMC054</b>	<b>GEOTECHNICAL ENGINEERING LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

#### Course Objectives

At the end of the course, the students will be able

- To impart knowledge on behavior and the performance of saturated and unsaturated soil.
- To attain adequate knowledge in assessing both physical and engineering behavior of soils through various experiments

#### List of Experiments

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Specific gravity of soil grains
4. Relative density of sands
5. Atterberg limits test
6. Determination of moisture - density relationship using Standard Proctor test.
7. Permeability determination (constant head and falling head methods)
8. Field density test (Core cutter and sand replacement methods)
9. Direct shear test on cohesion less soil
10. Unconfined compression test on cohesive soil
11. California Bearing Ratio Test
12. One dimensional consolidation test (Demonstration only)

**Total: 30 Hours**

#### Text Books:

T1: Punmia P.C., “Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd., 16th Edition, New Delhi, 2005.

T2: Venkatramaiah, C. “Geotechnical Engineering”, New Age International Publishers, New Delhi, 2010.

#### Reference Books:

R1: McCarthy D.F., “Essentials of Soil Mechanics and Foundations Basic Geotechniques”, Sixth Edition, Prentice-Hall, New Jersey, 2002.

R2: Das, B.M., “Principles of Geotechnical Engineering”, (fifth edition), Thomas Books, 2005

R3: Muni Budhu, “Soil Mechanics and Foundations”, John Willey & Sons, Inc, New York, 2008.

## COURSE OUTCOMES

At the end of this course the students will be able to,

<b>CO 1</b>	Determine index properties of soils	<b>K4</b>
<b>CO 2</b>	Classify soils based on experimental results	<b>K3</b>
<b>CO 3</b>	Understand and experience experimental measurement of the physical and mechanical soil properties commonly used in engineering practice	<b>K2</b>
<b>CO 4</b>	Design and conduct appropriate experiments, as well as to analyze and interpret data and generate soil report	<b>K6</b>
<b>CO 5</b>	Gain knowledge about appropriate experiments based on field conditions	<b>K2</b>

<b>22CMC055</b>	<b>ENVIRONMENTAL LABORATORY</b>	<b>ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
			<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### Course Objectives

- This subject includes the list of experiments to be conducted for characterization of water and municipal sewage
- At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.

### Any Eight Experiments

1. Sampling and preservation methods of water and wastewater
2. Determination of pH, Turbidity and Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of suspended, volatile and fixed solids
12. B.O.D. test
13. C.O.D. test
14. Introduction to Bacteriological Analysis (Demonstration only)

### Text Books:

- T1: Garg, S.K., “Environmental Engineering”, Vol.1 Khanna Publishers, New Delhi, 2011.  
T2: Punmia, B.C., Ashok K Jain and Arun K Jain, “Water Supply Engineering”, Laxmi Publications (P)  
Ltd., New Delhi, 13th Edition,2015.

### Reference Books:

- R1: Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2003.

### Web Links:

1. [http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk\\_labs/Environmental\\_Engineering\\_1/index.html](http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk_labs/Environmental_Engineering_1/index.html)

## COURSE OUTCOMES



At the end of this course the students will be able to,

<b>CO 1</b>	Understand the sampling and preservation methods of water and wastewater	<b>K2</b>
<b>CO 2</b>	Analyze physical and chemical parameters of water and waste water	<b>K4</b>
<b>CO 3</b>	Understand the criteria for determination of Physical characteristics of water and wastewater	<b>K2</b>
<b>CO 4</b>	Acquire knowledge on influence of chlorides and chlorine on water quality	<b>K3</b>
<b>CO5</b>	Acquire knowledge on DO, BOD and COD influence on water and wastewater	<b>K3</b>

**22EPD103**

**PERSONALITY DEVELOPMENT III**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

**COURSE OBJECTIVE:**

- To enhance the communication, interpersonal, group skills.

**UNIT I VERBAL APPTITUDE I 6**

Phonetics / Neutral Accent / Pronunciation – Speech Mechanism / Mouth & Face Exercise – Vowels & Consonants – Sounds – Syllable and Syllable Stress/ Word Stress – Sentence Stress & Intonation Articulation Exercise – Rate of Speech / Flow of Speech / Idiomatic Phrases.

**UNIT II VERBAL APTITUDE II 6**

Singular/plural – present tense / past tense – genders Prepositions – conjunctions – Choice of words –simple sentences – compound sentences – summarizing phrases Synonyms – Antonyms – Analogies –Similar Words.

**UNIT III SOFT SKILLS 6**

Attitude – Meaning–Features of attitude – Formation – Personality Factors –Types of attitude – change in attitude – developing Positive attitude.

**UNIT IV TIME MANAGEMENT 6**

Definition – Meaning–Importance, Value of time as an important resource – comparison of Time and Money – Circle of influence and circle of control – Definition of URGENT and IMPORTANT – Time Wasters and how to reduce – Procrastination – meaning and impact – 4 Quadrants.

**UNIT V TEAM BUILDING 6**

Meaning – Aspects of team building – Process of team building – Types of Teams – Team Ethics and Understanding – Team trust and commitment.

**TOTAL: 30 Hours**

**TEXT BOOKS:**

- T1. B N Ghosh, Managing Soft Skills and Personality, Mc graw Hill Publications
- T2. Shejwalkar and Ghanekar, Principles and Practices of Management, Mc Graw Hill Latest.
- T3. Roberta Roesch , Time management for Busy people, Tata McGraw–Hill Edition

**REFERENCE BOOKS:**

- R1. D. P. Sabharwal, Personality Development Handbook, Fingerprint publishing, 2021
- R2. Dr V M Selvaraj, Personality Development, Bhavani Publications

**WEBLINKS:**

1. <https://www.thebalancecareers.com/list-of-soft-skills-2063770>
2. <https://www.investopedia.com/terms/s/soft-skills.asp>
3. <https://in.indeed.com/career-advice/resumes-cover-letters/soft-skills>

**COURSE OUTCOMES**

<b>CO1:</b>	Articulate by understanding the rate and flow of speech.	<b>K3</b>
<b>CO2:</b>	Choose words and phrases appropriately for any verbal communication.	<b>K3</b>
<b>CO3:</b>	Develop a positive attitude in handling diverse situations.	<b>K4</b>
<b>CO4:</b>	Prioritize important and urgent tasks using the four quadrants method.	<b>K4</b>
<b>CO5:</b>	Practice team ethics and understanding when working with teams.	<b>K3</b>

## SEMESTER -VI

<b>22CMC061</b>	<b>DESIGN OF REINFORCED CEMENT CONCRETE ELEMENTS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives

- To enable the designer to learn the design of these basic reinforced concrete elements.
- To gain knowledge on the basic structural elements like beams, columns, slabs, walls and foundations

### **UNIT I INTRODUCTION 9**

Objective of structural design-Steps in RCC Structural Design Process- Type of Loads on Structures and Load combinations- Code of practices and Specifications - Concept of Working Stress Method, Ultimate Load Design and Limit State Design Methods for RCC – Properties of Concrete and Reinforcing Steel - Analysis and Design of Singly reinforced Rectangular beams by Limit State philosophy as detailed in IS code - Advantages of Limit State Method over other methods - Analysis and design of singly and doubly reinforced rectangular beams by Limit State Method.

### **UNIT II DESIGN OF BEAMS 9**

Analysis and design of Flanged beams for – Use of design aids for Flexure - Behaviour of RC members in Shear, Bond and Anchorage - Design requirements as per current code - Behaviour of rectangular RC beams in shear and torsion - Design of RC members for combined Bending, Shear and Torsion.

### **UNIT III DESIGN OF SLABS AND STAIRCASE 9**

Analysis and design of cantilever, one way simply supported and continuous slabs and supporting beams-Two way slab- Design of simply supported and continuous slabs using IS code coefficients- Types of Staircases – Design of dog-legged Staircase.

### **UNIT IV DESIGN OF COLUMNS AND FOOTINGS 9**

Types of columns –Axially Loaded columns – Design of short Rectangular, Square and circular columns Design of Slender columns- Design for Uniaxial and Biaxial bending using Column Curves. Concepts of Proportioning footings and foundations based on soil properties-Design of wall footing – Design of axially and eccentrically loaded Square, Rectangular pad and sloped footings – Design of Combined Rectangular footing for two columns only

### **UNIT V INTRODUCTION TO PRESTRESSED CONCRETE 9**

Basic concepts – Advantages and disadvantages – Materials required – Systems and methods of pre-stressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long-term deflections - Losses of pre-stress – Estimation of crack width.

**TOTAL: 45 hours**

### Text Books:

- T1: Varghese, P.C., “Limit State Design of Reinforced Concrete”, Prentice Hall of India, Pvt. Ltd., New Delhi,2017..
- T2: Gambhir. M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2016.
- T3: Unnikrishna Pillai, S., Devdas Menon, “Reinforced Concrete Design”, Tata McGraw- Hill Publishing Company Ltd., New Delhi

### Reference Books:

- R1: Krishna Raju, N., “Design of Reinforced Concrete Structures”, CBS Publishers & Distributors, New Delhi, 3rd Edition, 2008.

- R2: Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain, “Limit State Design of Reinforced Concrete”, Laxmi Publishing Pvt. Ltd., First Edition, New Delhi, 2007
- R3: Jain, A.K., “Limit State Design of RC Structures”, Nemchand Publications, Rourkee
- R4: Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
- R5: SP16, IS456:1978 “Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 2016
- R6: IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2016

#### Web Links:

1. <https://nptel.ac.in/courses/115102117>
2. <https://nptel.ac.in/courses/108106193>
3. <https://nptel.ac.in/courses/122106074>

#### COURSE OUTCOMES

At the end of this course the students will be able to,

<b>CO 1</b>	Classify the various design methodologies and code of practices for RCC design	<b>K3</b>
<b>CO 2</b>	Know the analysis and design of slabs and staircases under various conditions	<b>K2</b>
<b>CO 3</b>	Design the various types of beams in flexural conditions	<b>K4</b>
<b>CO 4</b>	Construct the design philosophy for different compression members and RC footings by using limit state method	<b>K3</b>
<b>CO 5</b>	Calculate the effective stresses and deflection in pre-stressed concrete structures	<b>K5</b>

**22CMC062**

**CONCRETE TECHNOLOGY**

L	T	P	Credits
3	0	0	3

#### COURSE OBJECTIVE: (Employability)

At the end of the course, the students will be able

- To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes.

#### UNIT I INTRODUCTION TO CONCRETE

**9**

Concrete; Properties of ingredients, tests, Production of concrete, mixing, compaction curing, Properties of fresh concrete, workability tests for fresh concrete, strength properties of hardened concrete: compressive strength, split tensile strength, flexural strength.

#### UNIT II CONCRETE MIX DESIGN

**9**

Concrete mix design: Design mix and Nominal mix. Proportioning of concrete mixes, basic considerations, cost, specifications, factors in the choice of mix proportion, different method of mix design (IS method; ACI method)

#### UNIT III CONCRETE CREEP, SHRINKAGE FATIGUE

**9**

Stress-strain curve for concrete, modulus of elasticity, Time dependent behavior of concrete - creep, shrinkage and fatigue; Concrete cracking, types of cracks, causes and remedies. Defects in Concrete, Non-destructive tests on concrete.

#### UNIT IV DURABILITY OF CONCRETE

**9**

Quality control, Behavior of concrete in extreme environment; temperature problem in concreting, hot weather, cold weather and under water conditions, Resistance to freezing,

sulphate and acid attack, efflorescence, fire resistance; Inspection and testing of concrete, Deterioration of concrete and its prevention Repair and rehabilitation.

## UNIT V SPECIAL CONCRETE

9

Special concrete: light Weight concrete, foam concrete, self compacting concrete, Fibre reinforced concrete, vacuum concrete, high strength concrete, ferrocement, Ready mix concrete, SIFCON, Shotcrete, High Performance concrete Polymer concrete, chemical admixtures: accelerators, retarders, plasticizers, super plasticizers, mineral admixtures: fly ash, silica fume, GGBFS, Metakaoline.

**TOTAL: 45 hours**

### TEXT BOOKS:

1. Gupta.B.L,AmitGupta,"concrete technology",jain Book Agency,2010
2. Shetty.M.S,"Concrete technology",S.chand and company Ltd, New Delhi,2003.
3. Bhavikatti.S.S,"Concrete Technology", I.K International Housing Private Ltd, New Delhi, 2005.
4. Santhakumar.A.R, "Concrete Technology", Oxford University press India, 2006.
5. Varghese.P.C, "Maintenance, Repair and Rehabilitation & Minor works of buildings",Prentice Hall India Private Ltd.2014.
6. Dodge Woodson R, "Concrete Structures, protection, Repair and Rehabilitation,Butterworth-Heinemann,Elsevier, New Delhi, 2012.

### REFERENCE BOOKS:

1. Gambhir.M.L, "CONCRETE TECHNOLOGY",Tata McGraw hill book Co.ltd.,Delhi,5th Edition,2013.
2. Neville. A M., "PROPERTIES OF CONCRETE", Longman, 5th Edition, 2011.
3. IS10262:2009 Recommended guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998.
4. Job Thomas, "Concrete Technology", Cengage Learning Pvt.Ltd, Delhi, 2015.

### WEBLINKS:

- <https://nptel.ac.in/courses/105102012>
- <https://www.digimat.in/nptel/courses/video/105106176/L01.html>

### COURSE OUTCOMES:

At the end of the course, the student will be able to

<b>CO 1</b>	Identify the functional role of ingredients of concrete and apply this knowledge to mix design	<b>K3</b>
<b>CO 2</b>	Design a concrete mix as per IS standards	<b>K3</b>
<b>CO 3</b>	Apply fundamental knowledge in the fresh and hardened properties of concrete to identify the reasons for the cracks	<b>K3</b>
<b>CO 4</b>	Understand the durability requirements of concrete	<b>K2</b>
<b>CO 5</b>	Select the most suited special concrete depending on the site requirement	<b>K5</b>

<b>22CMC063</b>	<b>COMPUTER AIDED DESIGN AND DRAWING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>LABORATORY</b>	<b>0</b>	<b>0</b>	<b>2</b>	

### COURSE OBJECTIVE: (Skill Development)

At the end of the course, the students will be able

- To study the design and preparation of structural drawings for concrete / steel structures using AutoCad and STADD Pro normally encountered in Civil Engineering practice.

### LIST OF EXERCISES

1. Drawing of a plan, elevation and cross section of a Residential Building for Corporation approval
2. Drawing of a plan, elevation and cross section for Industrial Structures
3. Design and Detailing of connection in Beam Column Joint
4. Design and Detailing of connection in Bracings with Gusset plate in Beam Column Joint
5. Design of RCC Slab (One Way) with detailing
6. Design of RCC Slab (Two Way) with detailing
7. Design and Detailing of RCC Rectangular Beams
8. Design and Detailing of RCC Tee Beam
9. Design of RCC Cantilever Beam using STADD Pro
10. Design of RCC Continuous Beam using STADD Pro
11. Analysis of Pin-jointed Truss using STADD Pro
12. Analysis of Framed Structure using STADD Pro

**TOTAL: 30 hours**

**REFERENCE BOOKS:**

- R1: Verma B.P., “Civil Engg. Drawing & House Planning”, Khanna publishers, Delhi, 2010.  
 R2: Balagopal & T.S. Prabhu, “Building drawing & detailing”, Spades Publishers, Calicut.  
 R3: Krishna Raju, “Structural Design & Drawing (Concrete & Steel)”, CBS Publishers 2nd Edition, 2005  
 R4: Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, “Design of steel structures”, Lakshmi Publications Pvt. Ltd 2006.

**COURSE OUTCOME:**

At the end of the course, the student will be able to

<b>CO 1</b>	Draw a plan, elevation and cross section of a residential building/industrial building for corporation approval	<b>K6</b>
<b>CO 2</b>	Develop a design template and detailing sheet for beam column joint and bracings in beam column joint	<b>K6</b>
<b>CO 3</b>	Design a two way slab or one way slab with detailing	<b>K4</b>
<b>CO 4</b>	Design and create a detailing drawing for different types of beams	<b>K6</b>
<b>CO 5</b>	Apply the knowledge of civil software to design various components of a framed structure	<b>K3</b>

<b>22CMC064</b>	<b>CONCRETE TECHNOLOGY LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**COURSE OBJECTIVE: (Skill Development)**

At the end of the course, the students will be able

- To learn the basic behavior of fresh and hardened concrete through basic property tests, workability test, destructive and non-destructive test.
- To get hands on experience by conducting the tests and evolving inferences.

**LIST OF EXPERIMENTS**

1. Consistency test, Initial and final setting time of cement.
  - i. Specific gravity test on cement, fine aggregate and coarse aggregate.
  - ii. Sieve analysis test on coarse aggregate and fine aggregate.
  - iii. Determination of flakiness index, elongation index of coarse aggregate.
  - iv. Strength test on cement: compression, tension.
  - v. Workability test of fresh concrete (conventional): Slump cone test, Flow table test, Compaction factor test, Vee-Bee consistometer test.

- vi. Workability test of fresh concrete (Self Compacting Concrete): Slump cone test, Flow table test, Compaction factor test, Vee-Bee consistometer test.
2. Strength test on hardened concrete (Conventional concrete): Compression, Tension, and Flexural.
3. Strength test on hardened concrete (Special concrete): Compression, Tension, and Flexural.
4. Durability test on (conventional and special concrete): Water penetration test, Rapid Chloride Penetration Test, Sorptivity test, Acid test.
5. NDT test on (conventional and special concrete): Re-bound hammer test, Ultrasonic pulse velocity test.
6. Mix Design of a particular grade of concrete
7. Practical study on different types of cracks and crack measurements in beams, columns of a building.

NOTE: Special Concrete may be any one of Fibre Reinforced Concrete, Self Compacting Concrete, High Strength Concrete, Polymer concrete.

**TOTAL: 30 hours**

### REFERENCE BOOKS:

- R1: Gambhir.M. L, “Concrete Technology”, Tata McGraw hill book Co.ltd., Delhi, 5<sup>th</sup> Edition,2013.  
 R2: Neville. A M., “Properties of Concrete”, Longman, 5<sup>th</sup> Edition, 2011.  
 R3: ACI 214, Recommended Practice for evaluation of the strength test results of concrete American Concrete Institute,FarmingtonHills,MI, [www.concrete.org](http://www.concrete.org).  
 R4: M.S.Shetty.”Concrete Technology” S.Chand publication, New Delhi, 2010.

### COURSE OUTCOMES:

**At the end of the course, the student will be able to**

<b>CO 1</b>	Develop knowledge on various physical properties of construction materials	<b>K2</b>
<b>CO 2</b>	Evaluate the workability, strength test parameters of fresh and hardened concrete	<b>K5</b>
<b>CO 3</b>	Compare and infer the results of the destructive and non-destructive testing procedures	<b>K3</b>
<b>CO 4</b>	Design the mix design for different types of concrete	<b>K3</b>
<b>CO 5</b>	Determining the durability concept of concrete	<b>K5</b>

<b>22EPD104</b>	<b>PERSONALITY DEVELOPMENT IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

### COURSE OBJECTIVES:

- To enhance the soft skills and prepare them towards the skills needed for their career.

#### **UNIT I      SOFT SKILLS      6**

Assertiveness – Meaning – Importance of assertiveness – Characteristics of Assertive communication –Merits – forms of assertion – Causes of misunderstanding

#### **UNIT II      COMMUNICATION SKILLS      6**

Meaning – Elements of Communication – Functions of Communication – Principles of Communication Formal and Informal Communication – Barriers in Communication – Characteristics of good – communication – Feedback – Communication systems.

**UNIT III PRESENTATION SKILLS****6**

Meaning – Importance of Presentation – Concept of 5 W’s and one H – understanding the audience –Types of presentations – How to make effective presentation.

**UNIT IV PRESENTATION SKILLS II****6**

Use of slide, PPT’s and visuals – Rules for slide presentation – precautions – seminars and conferences – Steps to eliminate Stage fear.

**UNIT V CHANGE MANAGEMENT****6**

Definition – Necessity – Resistance towards Change – 10 Principles of Change Management – Leaders approach – Effective Change management.

**TOTAL: 30 Hours****TEXT BOOKS:**

- T1. LaClair, J. and Rao, R. Helping Employees Embrace Change, McKinsey Quarterly, 2002, Number 4.
- T2. Spencer Johnson, Who Moved My Cheese, Vermilion, First edition
- T3. Adair, John, Effective Communication, London: Pan Macmillan Ltd., 2003.

**REFERENCE BOOKS:**

- R1. Bovee, Courtland L, John V. Thill & Barbara E. Schatzman. Business Communication Today, Tenth Edition. New Jersey: Prentice Hall, 2010.

**WEBLINKS:**

- 1. <https://www.thebalancecareers.com/communication-skills-list-2063779>
- 2. <https://www.mindtools.com/page8.html>

**COURSE OUTCOMES**

<b>CO1:</b>	Be assertive in their communication.	<b>K3</b>
<b>CO2:</b>	Differentiate the principles of formal and informal communication.	<b>K4</b>
<b>CO3:</b>	Make an effective presentation by understanding the audience.	<b>K3</b>
<b>CO4:</b>	Practice the rules of presentation using slides, PPT’s and visuals.	<b>K3</b>
<b>CO5:</b>	Discuss the principles of change management.	<b>K2</b>



## SEMESTER-VII

22CMC071	ENGINEERING ECONOMICS, ESTIMATION & COSTING	L 3	T 0	P 0	Credits 3
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### COURSE OBJECTIVE: (Employability)

At the end of the course, the students will be able

- To understand the impact the cost of a structure.
- To understand the technical specifications for various works of the projects.

### UNIT I INTRODUCTION

9

Basic Principles and Methodology of Economics. Demand/Supply – elasticity – Government Policies and Application. Theory of the Firm and Market Structure. Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes (3 lectures)- Public Sector Economics –Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank –Monetary Aggregates- Inflation and Phillips Curve. (2 lectures)

### UNIT II COST CONTROL –TECHNIQUES

9

Elements of Business/Managerial Economics and forms of organizations. Cost & Cost Control – Techniques, Types of Costs, Lifecycle costs, Budgets, Break even Analysis, Capital Budgeting, Application of Linear Programming. Investment Analysis – NPV, ROI, IRR, Payback Period, Depreciation, Time value of money (present and future worth of cash flows). Business Forecasting – Elementary techniques. Statements – Cash flow, Financial. Case Study Method

### UNIT III INDIAN ECONOMY

9

Indian economy - Brief overview of post-independence period – plans. Post reform Growth, Structure of productive activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment–Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.

### UNIT IV PROCESS OF ESTIMATION

9

Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipment costs; labour costs; rate analysis; Material survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost, cost sensitive index, market survey of basic materials. Use of Computers in quantity surveying

### UNIT V TENDER

9

Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts-. Preparing Bids- Bid Price buildup- Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process management - Workman's compensation, Contracts, Arbitration, Easement rights.

**TOTAL: 45 hours**

### TEXT BOOKS:

- T1: Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia  
T2: V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill  
T3: Misra, S.K. and Puri (2009), Indian Economy, Himalaya  
T4: Pareek Saroj (2003), Textbook of Business Economics, Sunrise Publishers

T5: M Chakravarty, Estimating, Costing Specifications & Valuation

T6: Joy P K, Handbook of Construction Management, Macmillan

T7: B.S. Patil, Building & Engineering Contracts

### REFERENCE BOOKS:

R1: Relevant Indian Standard Specifications. 9. World Bank Approved Contract Documents.

R2: FIDIC Contract Conditions.

R3: Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration

R4: Typical PWD Rate Analysis documents.

R5: UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations, 2016

R6: Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

### WEBLINKS:

1. [https://onlinecourses.swayam2.ac.in/nou20\\_cs11/](https://onlinecourses.swayam2.ac.in/nou20_cs11/)

2. <https://nptel.ac.in/courses/105103093>

3. <https://nptel.ac.in/courses/112107209>

### COURSE OUTCOMES:

**At the end of the course, the student will be able to**

<b>CO 1</b>	Relate to the macro-economic concepts, price indices, interest rates and taxes	<b>K2</b>
<b>CO 2</b>	Perform the present worth, future worth and annual worth analyses on one of more economic alternatives	<b>K5</b>
<b>CO 3</b>	Evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives	<b>K5</b>
<b>CO 4</b>	Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure	<b>K2</b>
<b>CO 5</b>	Apply the knowledge of competitive bidding on how to submit a competitive bid proposal	<b>K3</b>

<b>22CMC072 ESTIMATION &amp; COSTING LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### COURSE OBJECTIVE: (Skill Development)

At the end of the course, the students will be able

- To study the design and prepare the detailed estimate normally encountered in Civil Engineering practice.

### LIST OF EXERCISES

1. Draw a Plan and Cross section of a Wall and calculate its Quantities.
2. Draw a Plan and Cross section of a single room of 5 m x 4 m (inner size), and Estimate the quantities of 1) Earthwork 2) Concrete in Foundation 3) Brickwork in foundation 4) Brickwork in Superstructure.
3. Draw a Plan and Cross section of a room by Long wall and Short wall method.
4. Draw a Plan and Cross section of a room using Centre line Method.
5. Estimate a Slab and Column.
6. Draw and prepare a detailed estimate of a septic tank for 25 users.
7. Draw and prepare a rough estimation for a double room in MS office Excel.
8. Work out the rate per unit for Cement concrete in foundation 1:4:10 for 10 cum.
9. Work out the rate per unit for Brickwork using I class bricks in CM 1: 4 for 10 cum.
10. Calculate the detailed estimate of a building.

**TOTAL: 30 hours**

**REFERENCE BOOKS:**

- T1: M Chakravarty, Estimating, Costing Specifications & Valuation  
T2: UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations,2016  
T3: Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

**COURSE OUTCOME:**

**At the end of the course, the student will be able to**

<b>CO 1</b>	Determine the quantity required for construction of various building components	<b>K5</b>
<b>CO 2</b>	Compare the plan and cross section of the room drawn using various methods and select the optimum	<b>K4</b>
<b>CO 3</b>	Estimate the quantity required for slab, column and a double room	<b>K5</b>
<b>CO 4</b>	Deduct the cost estimate for brickwork and RCC foundation	<b>K5</b>
<b>CO 5</b>	Develop a detailed estimate for a building	<b>K6</b>

# **SYLLABUS**

## **PROFESSIONAL ELECTIVE COURSES**

<b>22ECV101 PRESTRESSED CONCRETE STRUCTURES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives

- Prestressed concrete is used extensively in bridges, multistory buildings and many other important parts of today's modern infrastructure.
- The inherent weakness of concrete in tension is offset by introducing a pre-compression in a prestressed member.
- To improve its service load behavior such as reduced deflections and cracking.

### **UNIT I                      DESIGN FOR FLEXURE AND SHEAR                      9**

Basic assumptions of flexural design – Permissible stresses in steel and concrete as per I.S.1343 Code – Different Types of sections - Design of sections of Type I and Type II post-tensioned and pre tensioned beams – Check for flexural capacity based on I.S. 1343 Code – Influence of Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

### **UNIT II                      DEFLECTION AND DESIGN OF ANCHORAGE ZONE                      9**

Factors influencing deflections – Short term deflections of uncracked members – Prediction of long-term deflections due to creep and shrinkage – Check for serviceability limit states. Determination of anchorage zone stresses in post-tensioned beams – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

### **UNIT III                      COMPOSITE BEAMS                      9**

Analysis and design of composite beams – Concordant cable and linear transformation – Calculation of stresses-Segmental construction in bridges

### **UNIT IV                      CONTINUOUS BEAMS                      9**

Methods of achieving continuity in continuous beams – Analysis for secondary moments – Principles of design.

### **UNIT V                      TENSION AND COMPRESSION MEMBERS                      9**

Role of prestressing in members subjected to Tensile forces and compressive forces – Design of tension and compression members – Tanks, pipes and poles – Partial prestressing –Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing.

**TOTAL: 45 hours**

### **Text Books:**

- T1: Krishna Raju N., "Prestressed concrete", 5th Edition, Tata McGraw Hill Company, NewDelhi, 2062  
T2: Pandit.G.S. and Gupta.S.P., "Prestressed Concrete", CBS Publishers and Distributers Pvt.Ltd, 2012.  
T3: Lin, Tung Yen, and Ned Hamilton Burns. Design of prestressed concrete structures. New York: Wiley, 1963.

### **Reference Books:**

- R1: Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House, 2012.  
R2: Dayaratnam.P., "Prestressed Concrete Structures", Oxford and IBH, 2013  
R3: Lin T.Y. and Ned.H.Burns, "Design of prestressed Concrete Structures", Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.  
R4: IS1343:1980, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, NewDelhi, 2012

R5: . IS1343:1980, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi, 2012.

**Web Links:**

1. <https://nptel.ac.in/courses/115102136>
2. <https://nptel.ac.in/courses/108106252>
3. <https://nptel.ac.in/courses/122106167>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Design the prestressed concrete members for flexure and shear as per the relevant design code	<b>K3</b>
<b>CO 2</b>	Compute the deflection of prestressed concrete members and design the anchorage zone	<b>K4</b>
<b>CO 3</b>	Design of composite Prestress Concrete beams	<b>K3</b>
<b>CO 4</b>	Design of continuous prestress Concrete beams	<b>K3</b>
<b>CO 5</b>	Design of pre stressed concrete tension and compression members	<b>K3</b>

<b>22ECV102</b>	<b>SPECIAL CONCRETES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

- To get exposed to behavioral aspects of concrete
- To get exposed to different types of concretes and their characteristics and applications.

**UNIT I CHARACTERISTICS OF CONCRETE AND MIX DESIGN 9**

Properties of fresh and hardened concrete - strength, elastic properties, creep and shrinkage - variability of concrete strength - quality control - Principles of concrete mix design, methods of concrete mix design - High Strength Concrete Mix Design - Super - Plasticizers - Principles involved in mix design of high performance concrete with fly ash or GGBS replacements.

**UNIT II CONCRETING METHODS 9**

Process of manufacturing of concrete-methods of transportation-placing and curing - extreme weather concreting - special concreting methods - vacuum dewatering - under water technology-special form work-Ready mix Concrete.

**UNIT III POLYMER AND FIBER CONCRETES 9**

Polymer concrete-Types, Properties and Applications - Blended cement concretes Fibre-reinforced Concrete-Different types of metallic and non-metallic fibres - Types, Properties and Applications, Slurry-infiltrated fibre reinforced concrete.

**UNIT IV FERROCEMENT, LOW AND HIGH DENSITY CONCRETES 9**

Ferrocement and its applications, Light Weight concrete - High Density concrete - Roller compacted concrete - Types, Properties and Applications.

**UNIT V OTHER CONCRETES 9**

Bacterial concrete - Born again concrete (Recycled Aggregate concrete)-Electric concrete (Smart concrete) description - applications. High performance concrete. Production and applications-Self compacting concrete - Reactive powder concrete - Description, Properties and Applications.

**TOTAL: 45 Hours**

**Text Books:**

- T1: Gupta. B. L., Amit Gupta, “Concrete Technology”, Jain Book Agency, 2010.  
 T2: Gambhir, M.L., “Concrete Technology”, 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007  
 T3: IS10262-2009 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998.

**Reference Books:**

- R1: Fintel, "Hand book of Concrete EnsiVannostrand", CBS Publishers & Distributors, 2004.
- R2: Metha. P.K, and Monterio. P.J.M, "Concrete-Structures", Properties and Materials, 3rd Edition, McGraw Hill Professional, 2006.
- R3: Shetty. M.S, "Concrete Technology" Chand. S, and Company Ltd, Delhi, 2000.
- R4: Neville.A.M, "Properties of Concrete", Pitman Publishing Limited, London, 1990.
- R5: Aitkens, "High Performance Concrete", McGraw Hill, 1999.

**Web Links:**

1. <https://nptel.ac.in/courses/115102169>
2. <https://nptel.ac.in/courses/108106199>
3. <https://nptel.ac.in/courses/122106120>

**COURSE OUTCOMES**

At the end of this course, the students will be able to

CO 1	Gain knowledge on limit state design concepts and joints	K2
CO 2	Understand the design of tension members for axial loading in braced system and unbraced system	K2
CO 3	Analyze the distribution of axial force on gusset and column base plate in bracing and column joints	K3
CO 4	Design the laterally supported and unsupported beams	K3
CO 5	Understand the concepts plastic analysis of structures	K3

<b>22ECV103</b>	<b>EARTHQUAKE ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

- To introduce the basics of Earthquake Engineering
- To introduce the engineering seismology, building geometrics & characteristics, structural irregularities
- To develop guidelines for earthquake engineering
- To discuss code provisions and their application on different types of structures

**UNIT I THEORY OF VIBRATIONS 9**

Concept of inertia and damping – Types of Damping – Difference between static forces and dynamic excitation – Degrees of freedom – SDOF idealization – Equations of motion of SDOF system for mass as well as base excitation – Free vibration of SDOF system – Response to harmonic excitation – Impulse and response to unit impulse – Duhamel integral.

**UNIT II MULTIPLE DEGREE OF FREEDOM 9**

Two degree of freedom system – Normal modes of vibration – Natural frequencies of vibrations - Mode shapes - Introduction to Multiple degree of Freedom systems (MDOF) systems – Decoupling of equations of motion – Concept of mode superposition (No derivations).

**UNIT III ELEMENTS OF SEISMOLOGY 9**

Causes of Earthquake – Geological faults – Tectonic plate theory – Elastic rebound – Epicenter–Hypocenter– Primary, shear and Raleigh waves – Seismogram – Magnitude and intensity of earthquakes – Magnitude and Intensity scales – Spectral Acceleration - Information on some disastrous earthquakes

**UNIT IV RESPONSE OF STRUCTURES TO EARTHQUAKE****9**

Response and design spectra – Design earthquake – concept of peak acceleration – Site specific response spectrum – Effect of soil properties and damping – Liquefaction of soils – Importance of ductility – Methods of introducing ductility into RC structures.

**UNIT V DESIGN METHODOLOGY****9**

IS 1893, IS 13920 and IS 4326 – Codal provisions – Design as per the codes – Base isolation techniques – Vibration control measures – Important points in mitigating effects of earthquake on structures.

**TOTAL: 45 Hours****Text Books:**

- T1: Arya, A.S., ed., “Earthquake Engineering”, Jai Krishna 60th Birthday Anniversary Commemoration Volume, ISET, Sarita Prakashan, Meerut, 1976.  
 T2: Chopra, A.K., “Dynamics of Structures – Theory and Applications to Earthquake Engineering”, 4th Edition, Pearson Education, 2014  
 T3: Wang, C. K., “Indeterminate structural analysis”, Tata M New Delhi, 2010.

**Reference Books:**

- R1: Biggs, J.M., “Introduction to Structural Dynamics”, McGraw–Hill Book Co., N.Y., 1965  
 R2: Dowrick, D.J., “Earthquake Resistant Design”, John Wiley & Sons, London, 1988  
 R3: Paz, M., “Structural Dynamics – Theory & Computation”, CSB Publishers & Distributors, Shahdara, Delhi, 2nd Edition, 2013, NPEEE Publications.  
 R4: Rajasekaran. S, & G. Sankarasubramanian., “Computational Structural Mechanics”, PHI Learning Pvt. Ltd, 2015  
 R5: Negi L.S.andJangidR.S.,Structural Analysis, Tata McGraw Hill Publishing Co.Ltd.2004

**Web Links:**

1. <https://nptel.ac.in/courses/11510295>
2. <https://nptel.ac.in/courses/108106210>
3. <https://nptel.ac.in/courses/122106245>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

CO 1	Apply the basics of Earthquake Engineering	K3
CO 2	Demonstrate the dynamics of structural system under earthquake load	K4
CO 3	Understand the principles of earthquake resistant design	K2
CO 4	Analyze the influence of the structural / geometrical design in building characteristics	K4
CO 5	Design the beam column junctions in buildings subjected to earthquake	K3

<b>22ECV104</b>	<b>METAL STRUCTURE BEHAVIOUR</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

- To describe the behavior members towards various types of loading and their failure.
- To design connections for various structural systems and including loading condition separately & combined medium

**UNIT I INTRODUCTION TO METAL AND CONNECTIONS****9**

Metal properties, Load and stresses- Advantages and Disadvantages, Connections- Bolts - Bearing Types & Slip critical type, Plate joints- Lap joint & Butt joints- Single Cover- Double Cover butt joint. Weld – Properties- Fillet weld & Butt weld.



**UNIT II BEHAVIOUR OF LOADING AND CONNECTIONS 9**

Metals behavior on loading through connections – Yielding, Rupture, Block shear failures, Dispersion medium in bolts and plates- Buckling – Crippling- Minor axis bending of metals, Prying failure in T-section members.

**UNIT III SIMPLE CONNECTIONS 9**

Design of Shear connections for Rolled sections and Built up sections - Beam to Column Flange orientation, Column web Orientation, Beam to beam connections, Design of Moment connections – Directly weld and Plate connections- Beam to column & Beam to Beam Connections Both orientation.

**UNIT IV PLATE GIRDERS AND BRACED MEMBERS 9**

Design of Plate Girders- Laterally Supported & unsupported, Braced frames- Types of Bracing – K bracing- X bracing- Knee bracing- Chevron bracing and their design. Design of gusset plate-dispersion medium

**UNIT V COMBINED BEHAVIOUR IN MEMBERS 9**

Design of members for shear and tension in same medium- Combined effects- Resultant stress in bolts and members

**TOTAL: 45 Hours****Text Books:**

- T1: P. Purushothaman, Reinforced Concrete Structural elements – Behaviour, Analysis and Design, Tata McGraw Hill Publ. Co. Ltd., New Delhi, 1984.  
 T2: PasalaDayaratnam, Design of Steel Structure, A.H. Wheeler & Co Ltd., 1990.  
 T3: Dayaratnam, P., “Design of Steel Structures”, Second edition, S. Chand & Company, 2007.

**Reference Books:**

- R1: Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995.  
 R2: Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990.  
 R3: Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982  
 R4: Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd.,2013  
 R5: Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company,2015

**Web Links:**

1. <https://nptel.ac.in/courses/115102117>
2. <https://nptel.ac.in/courses/108106193>
3. <https://nptel.ac.in/courses/122106074>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Analyze the Bolted and welded connection for the given loading condition	<b>K4</b>
<b>CO 2</b>	Understand the design of tension members for axial loading in braced system and unbraced system	<b>K2</b>
<b>CO 3</b>	Design members for various loadings and failure patterns as per codal provisions	<b>K3</b>
<b>CO 4</b>	Design members for both shear and moment connections	<b>K3</b>
<b>CO 5</b>	Design of plate girders based on support conditions	<b>K3</b>

**Course Objectives**

At the end of the course, the students will be able

- To assess soil behavior with the mineralogy present and advanced soil testing of soils such as in thermal, chemical, magnetic fields.
- To do seepage analysis for finding discharge calculation and stability.

**UNIT I INTRODUCTION & SOIL CLASSIFICATION 9**

Origin, Nature and type of Soils, its formation and deposition – Terminology of different types of soil– Phase system- Volume- Weight Relationship- terms of weight, volume, void ratio and porosity-Basic Definition and Relationship- Determination of various parameters: Moisture content, Unit Weight, Specific Gravity--Particle size Analysis- Sieve analysis – Stoke`s Law- Sedimentation Analysis – Soil Classification for engineering purposes – Particle size Classification, Textural classification, Unified soil Classification and Indian Standard Classification System – Field Identification of soils- Clay Mineralogy- Base Exchange Capacity

**UNIT II PLASTICITY CHARACTERISTICS OF SOIL 9**

Plasticity of Soils- Consistency limits – Liquid Limit- Cone Penetrometer Method- Plastic limit- Shrinkage Limit- Method of Determination of Shrinkage limit- Plasticity, Liquidity and Consistency Indexes– Measurement of Consistency- Sensitivity- Thixotropy- Activity of Soils- Compaction- Standard Proctor Test- Factors affecting Compaction

**UNIT III SOIL WATER & PERMEABILITY OF SOIL 9**

Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction - Effective stress concepts in soil – Total, neutral and effective stress distribution in soil in effect of Water table - Permeability – Darcy`s Law, Permeability measurement in the laboratory and Field methods- Factors affecting permeability – Seepage Velocity- Quick sand condition – Seepage Analysis – Laplace Equation- Introduction to flow nets –Properties and uses – Permeability of Stratified Soil Deposits- Application to simple problems.

**UNIT IV STRESS DISTRIBUTION 9**

Stress distribution in soil media – Boussinesq`s formula – stress due to point load, line load and strip load, uniformly loaded circular and rectangular loaded area – Newmark`s Influence charts – Westergaard equation for point load- Contact pressure under rigid and flexible area – Theory of compaction- Laboratory Determination of Optimum moisture content and maximum dry density- Factors affecting compaction

**UNIT V SHEAR STRENGTH & CONSOLIDATION 9**

Introduction on Consolidation- Comparison of Compaction and Consolidation- Components of settlement-Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test- Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand.

**TOTAL: 45 Hours**

**Text Books:**

T1: Punmia P.C., “Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd., 16th Edition, New Delhi, 2005.

T2: Venkatramaiah, C. “Geotechnical Engineering”, New Age International Publishers, New Delhi, 2010.



**Text Books:**

T1: Punmia P.C., “Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd., 16th Edition, New Delhi, 2005.

T2: Venkatramaiah, C. “Geotechnical Engineering”, New Age International Publishers, New Delhi, 2010.

**Reference Books:**

R1: McCarthy D.F., “Essentials of Soil Mechanics and Foundations Basic Geotechniques”, Sixth Edition, Prentice-Hall, New Jersey, 2002.

R2: Das, B.M., “Principles of Geotechnical Engineering”, (fifth edition), Thomas Books, 2005

R3: Muni Budhu, “Soil Mechanics and Foundations”, John Willey & Sons, Inc, New York, 2008.

**Web Links:**

➤ <https://nptel.ac.in/courses/105105168>

➤ <https://nptel.ac.in/courses/105103207>

**COURSE OUTCOMES**

At the end of this course, the student will be able to

<b>CO 1</b>	Acquainted with stability analysis of slopes	<b>K2</b>
<b>CO 2</b>	Determine the earth pressures on foundations and other substructure	<b>K3</b>
<b>CO 3</b>	Understand the principles of Retaining wall	<b>K2</b>
<b>CO 4</b>	Understand the types of sheeting and cofferdam	<b>K2</b>
<b>CO 5</b>	Evaluate stability Analysis of Caissons	<b>K5</b>

<b>22ECV107</b>	<b>FOUNDATION ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

At the end of the course, the students will be able

- To impart knowledge on common method of sub soil investigation and design of foundation and acquires the capacity to investigate the soil condition and to select a suitable foundation.
- To learn about types and purposes of different foundation systems and structures.

**UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9**

Scope and objectives – Methods of exploration-auguring and boring – Water boring and rotatory drilling – Depth of boring – Spacing of bore hole - Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Bore log report – Penetration tests (SPT and SCPT) – Data interpretation (Strength parameters and Liquefaction potential) - Selection of foundation based on soil condition.

**UNIT II SHALLOW FOUNDATION 9**

Introduction – Location and depth of foundation – codal provisions – Types of foundation – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi’s formula and BIS formula – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure

**UNIT III FOOTINGS AND RAFTS 9**

Contact pressure distribution below footings and Contact pressure distribution below raft – Isolated footings and combined footings – Types and proportioning - Mat foundation– Types, applications uses and proportioning- floating foundation.

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley’s) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity – Group capacity by different methods (Feld’s rule, Converse Labara formula and block failure criterion) — Interpretation of pile load test – Forces on pile caps – under reamed piles – Capacity under compression and uplift

**UNIT V SETTLEMENT OF SHALLOW AND DEEP FOUNDATION 9**

Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimizing settlement, differential settlement- Settlement of pile groups

**TOTAL: 45 Hours**

**TEXT BOOKS:**

- T1: Punmia, B.C., “Soil Mechanics and Foundations”, Laxmi publications pvt. Ltd., New Delhi, 6th Edition, 2005.
- T2: Murthy, V.N.S, “Soil Mechanics and Foundation Engineering”, UBS Publishers Distribution Ltd, New Delhi, 1 st Edition, 2008.
- T3: Varghese .P.C, “Foundation Engineering”, PHI Learning Pvt Ltd, New Delhi, 2005.

**REFERENCE BOOKS:**

- R1: Das, B.M. “Principles of Foundation Engineering, Thomson Books / COLE, 7th edition, 2010.
- R2: Venkatramaiah,C.”Geotechnical Engineering”, New Age International Publishers, New Delhi, 2010.

**Web Links:**

- <https://nptel.ac.in/courses/105105176>
- <https://nptel.ac.in/courses/105101083>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior	<b>K5</b>
<b>CO 2</b>	Calculate the bearing capacity of soils	<b>K3</b>
<b>CO 3</b>	Evaluate the contact pressure of soil at different points	<b>K5</b>
<b>CO 4</b>	Understand the forces acting on the pile foundation	<b>K2</b>
<b>CO 5</b>	Understand the Settlement of shallow and deep foundation	<b>K2</b>

		<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>22ECV108</b>	<b>GROUND IMPROVEMENT TECHNIQUES</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

At the end of the course, the students will be able

- To assess the general behavior of soil in slope stability and earth pressure
- To analyze the lateral forces acting on substructure.

**UNIT I PROBLEMATIC SOIL AND GROUND IMPROVEMENT TECHNIQUES**

**9**

Ground improvement - Role of ground improvement in foundation engineering – methods of ground improvement –geotechnical problems in alluvial, lateritic and black cotton soils –

Selection of suitable ground improvement techniques based on soil conditions.

**UNIT II DEWATERING 9**

Dewatering Techniques - Well points – Vacuum and electro-osmotic methods – Seepage analysis for two dimensional flow - fully and partially penetrated slots inhomogeneous deposits (Simple cases only).

**UNIT III GROUND IMPROVEMENT METHODS 9**

In-situ densification of cohesion-less soils and consolidation of cohesive soils: Dynamic compaction Vibro flotation, Sand compaction piles. Consolidation: Preloading with sand drains, and fabric drains, Stone columns - Lime piles installation techniques only – relative merits and limitations – deep soil mixing.

**UNIT IV GROUTING TECHNIQUE 9**

Grouting - Types of grouts – Suspension grouts - solutions grouts – Grouting equipment and method - Grouting with soil, Bentonite - cement mixes and asphalt - Grout monitoring schemes.

**UNIT V GEOSYNTHETICSAPPLICATIONS 9**

Geo synthetics - Types – functions of Geotextiles – Separation – Filtration – Drainage - reinforcement – Geo membranes - Containments and barriers -Application to Ground Anchors.

**TOTAL: 45 Hours**

**TEXT BOOKS**

T1: PurushothamaRaj .P, “Ground Improvement Techniques”, Laxmi Publications (P) Ltd.,New Delhi, 2000.

**REFERENCES**

R1: Koerner .R.M, “Construction and Geotechnical Methods in Foundation Engineering”, McGraw Hill, New York, 1984.

R2: Moseley .M.P, “Ground Improvement”, Blockie Academic and Professional,Chapman and Hall, Glassgow, 1998.

R3: Winterkorn .H.F and Fang .H.Y, “Foundation Engineering Hand Book”, Van Nostrand Reinhold, 1994.

**Web Links:**

- <https://nptel.ac.in/courses/105105168>
- <https://nptel.ac.in/courses/105103207>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Identify the problematic soil and select proper ground improvement techniques	<b>K2</b>
<b>CO 2</b>	Analysis the flow pattern in subsoil and implement dewatering techniques	<b>K4</b>
<b>CO 3</b>	Understand the different forms of ground improvement techniques	<b>K2</b>
<b>CO 4</b>	Understand the grouting method and techniques adopted in grouting	<b>K2</b>
<b>CO 5</b>	Understand the basic concepts of Geosynthesis	<b>K2</b>

<b>22ECV109</b>	<b>ENVIRONMENTAL GEOTECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

At the end of the course, the students will be able

- Have an exposure to interdisciplinary issues pertaining to environment and geotechnical engineering

- Be trained to develop sustainable and environmentally sound solutions for geotechnical problems
- Understand the relevance of various legal aspects involved in addressing environmental consequences associated with geotechnical issues

**UNIT I SOIL – POLLUTANT INTERACTION 9**

Introduction to Geo environmental engineering – environmental cycle – sources, production and classification of waste – causes of soil pollution – factors governing soil-pollutant interaction – failures of foundations due to pollutants – case studies.

**UNIT II SITE SELECTION AND SAFE DISPOSAL OF WASTE 9**

Safe disposal of waste – site selection for landfills – characterization of land fill sites – waste characterization – stability of landfills – current practice of waste disposal – passive containment system – application of geo synthetics in solid waste management – rigid or flexible liners

**UNIT III TRANSPORT OF CONTAMINANTS 9**

Contaminant transport in sub surface – advection – diffusion – dispersion – governing equations – contaminant transformation – sorption – biodegradation – ion exchange – precipitation – hydrological consideration in land fill design – ground water pollution – bearing capacity of compacted fills – foundation for waste fill ground – pollution of aquifers by mixing of liquid waste – protecting aquifers.

**UNIT IV WASTE STABILIZATION AND DISPOSAL 9**

Hazardous waste control and storage system – stabilization/ solidification of wastes – micro and macro encapsulation – absorption, adsorption, precipitation- detoxification – mechanism of stabilization – organic and inorganic stabilization – utilization of solid waste for soil improvement.

**UNIT V REMEDIATION OF CONTAMINATED SOILS 9**

Rational approach to evaluate and remediate contaminated sites – monitored natural attenuation – ex-situ and in situ remediation – solidification, bio – remediation, incineration, soil washing, electro kinetics, soil heating, verification, bio venting – Ground water remediation – pump and treat, air sparging, reactive well.

**TOTAL: 45 hours**

**Text Books**

- T1: Wentz, C.A., Hazardous Waste Management, McGraw Hill, Singapore, 1989.  
 T2: Daniel, B.E., Geotechnical Practice for waste disposal, Chapman and Hall, London, 1993.  
 T3: Proceedings of the International symposium of Environmental Geotechnology (Vol.I and II), Environmental Publishing Company, 1986 and 1989.

**Reference Books**

- R1: Ott, W.R., Environmental Indices, Theory and Practice, Ann. Arbor, 1978.  
 R2: Fried, J.J., Ground Water Pollution, Elsevier, 1975.  
 R3: ASTM Special Technical Publication 874, Hydraulic Barrier in Soil and Rock, 1985.  
 R4: Westlake, K., (1995), Landfill Waste pollution and Control, Albion Publishing Ltd., England, 1995.  
 R5: Lagrega, M.D., Buckingham, P.L., and Evans, J.C., Hazardous Waste Management, McGraw Hill, Inc. Singapore, 1994.

**Web Links:**

- <https://nptel.ac.in/courses/105105168>
- <https://nptel.ac.in/courses/105103207>

## COURSE OUTCOMES

At the end of this course the students will be able,

<b>CO 1</b>	To understand the behavior of pollutants in soil	<b>K2</b>
<b>CO 2</b>	To explore an idea about Geosynthesis	<b>K3</b>
<b>CO 3</b>	To realize the transportation and transformation of contaminants	<b>K2</b>
<b>CO 4</b>	To know the mechanism of solid wastes & its influence in soil stabilization	<b>K2</b>
<b>CO 5</b>	To know the basic remediation techniques	<b>K2</b>

		<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>22ECV110</b>	<b>ENVIRONMENTAL ENGINEERING</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives

- To realize the different water treatment techniques and sludge management and to understand the advanced water treatment techniques

### **UNIT I PLANNING FOR WATER SUPPLY SYSTEM 9**

Public water supply system - Planning - Objectives - Design period - Population forecasting – Water demand -Sources of water and their characteristics - Surface and Groundwater- Impounding Reservoir Well hydraulics - Development and selection of source – Water quality - Characterization - Water quality standards

### **UNIT II WATER TREATMENT 9**

Objectives - Unit operations and processes -Principles, functions design and drawing of Flash mixers, flocculator, sedimentation tanks and sand filters -Disinfection- Residue Management.

### **UNIT III SEWER DESIGN 9**

Sewerage – Hydraulics of flow in sewers – Objectives – Design period - Design of sanitary and storm sewers – Small bore systems - Computer applications – Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps and pipe Drainage -. Plumbing System for Buildings – One pipe and two pipe system

### **UNIT IV PRIMARY TREATMENT OF SEWAGE 9**

Objective – Unit Operation and Processes – Selection of treatment processes – Onsite sanitation - Septic tank, Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Operation and Maintenance aspects

### **UNIT V SECONDARY TREATMENT OF SEWAGE AND SLUDGE MANAGEMENT 9**

Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units - Activated Sludge Process and Trickling filter, other treatment methods – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage – Recent Advances in Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants. Objectives of sludge treatment - properties and characteristics of sludge - Thickening - sludge digestion - drying beds - conditioning and dewatering - sludge disposal - elutriation.

**TOTAL: 45 Hours**

### Text Books:

- T1: Garg, S.K., “Environmental Engineering”, Vol.1 Khanna Publishers, New Delhi, 2011  
T2: Punmia, B.C., Ashok K Jain and Arun K Jain, “Water Supply Engineering”, Laxmi Publications (P) Ltd., New Delhi, 13th Edition,2015.



**Reference Books:**

- R1: Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2003.  
 R2: Syed R.Qasim and Edward M.MotleyGuang Zhu, Water Works Engineering  
 R3: Planning, Design and Operation, Prentice Hall of India Private Limited, New Delhi – 2006.

**Web Links:**

- <https://nptel.ac.in/courses/105105201>
- <https://nptel.ac.in/courses/105106119>
- <https://nptel.ac.in/courses/103107084>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Understand the planning of water supply, objectives design period and population forecasting	<b>K2</b>
<b>CO 2</b>	Understand basics and design the unit operation and processes that are used in water treatment	<b>K2</b>
<b>CO 3</b>	Understand the construction, operation & maintenance aspects of water treatment	<b>K2</b>
<b>CO 4</b>	Understand the principles of primary treatment and its functions	<b>K2</b>
<b>CO 5</b>	Acquire knowledge of secondary treatment technology and sludge management	<b>K2</b>

		<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>22ECV111</b>	<b>AIR AND NOISE POLLUTION CONTROL</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

- To impart knowledge on the effects of air pollutants on atmosphere and understand the different modelling techniques employed for air pollution monitoring.
- To impart knowledge on the principles and design of control of indoor/ particulate / gaseous air pollutant and its emerging trends

**UNIT I INTRODUCTION 9**

Structure and composition of Atmosphere – Sources and classification of air pollutants - Effects of air pollutants on human health, vegetation & animals, Materials & Structures – Effects of air Pollutants on the atmosphere, Soil & Water bodies – Long- term effects on the planet – Global Climate Change, Ozone Holes – Ambient Air Quality and Emission Standards – Air Pollution Indices – Emission Inventories – Ambient and Stack Sampling and Analysis of Particulate and Gaseous Pollutants

**UNIT II AIR POLLUTION MONITORING AND MODELLING 9**

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns - Transport & Dispersion of Air Pollutants – Modeling Techniques – Instrumentation – Sampling techniques – Stack monitoring – Air Pollution Climatology.

**UNIT III CONTROL OF PARTICULATE CONTAMINANTS 9**

Factors affecting Selection of Control Equipment – Gas Particle Interaction, – Working principle, Design and performance equations of Gravity Separators (cyclone) , Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations – Process Control and Monitoring – Costing of APC equipment – Case studies for stationary and mobile sources.

**UNIT IV CONTROL OF GASEOUS CONTAMINANTS****9**

Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters – Process control and Monitoring - Operational Considerations - Costing of APC Equipment – Case studies for stationary and mobile sources.

**UNIT V AUTOMOBILE AND NOISE POLLUTION****9**

Vehicular Pollution: Automobile emission- Types of emissions- Exhaust emissions, evaporative emissions, crank-case emissions- Prevention and control of vehicular pollution. Noise Pollution: Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures. Sources types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control

**TOTAL: 45 hours****Text Books:**

T1: Anjaneyulu. Y, “Air Pollution & Control Technologies” Allied Publishers (P) Ltd.,India, 2002

T2: Noel de Nevers, "Air Pollution Control Engg"., Mc Graw Hill, New York, 1995

**Reference Books:**

R1: Arthur C.Stern, „Air Pollution (Vol.I – Vol.VIII)“, Academic Press, 2006. 3. Daniel Vallero “

Fundamentals of Air Pollution”, Fourth Edition,2008

R2: David H.F. Liu, Bela G. Liptak „Air Pollution“, Lweis Publishers, 2000.

**Web Links:**

- <https://nptel.ac.in/courses/105102089>
- <https://nptel.ac.in/courses/105104099>
- [https://onlinecourses.nptel.ac.in/noc22\\_ce22/preview](https://onlinecourses.nptel.ac.in/noc22_ce22/preview)

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Understand the structure and composition of atmosphere and its effect on human health, vegetation and animals	<b>K2</b>
<b>CO 2</b>	Identify various air pollution modelling techniques and understand meteorology	<b>K2</b>
<b>CO 3</b>	Identify appropriate control equipments for particulate contaminants	<b>K2</b>
<b>CO 4</b>	Identify proper control equipments for gaseous contaminants	<b>K2</b>
<b>CO 5</b>	Understand the consequences of vehicular and noise pollution	<b>K2</b>

	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>22ECV112 SOLID AND HAZARDOUS WASTE MANAGEMENT</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

- To impart knowledge on the elements of managing solid wastes from Municipal and industrial sources including the related engineering principles, design criteria, methods and equipments
- To educate the students about the different types of waste disposal techniques

## **UNIT I SOURCES, CLASSIFICATION AND REGULATORY FRAMEWORK 9**

Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management -- Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, nuclear wastes - lead acid batteries, electronic wastes , plastics and fly ash – Elements of integrated waste management and roles of stakeholders - Financing and Public Private Participation for waste management.

## **UNIT II WASTE CHARACTERIZATION AND SOURCE REDUCTION 9**

Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Extended producer responsibility - Recycling and reuse

## **UNIT III STORAGE, COLLECTION AND TRANSPORT OF WASTES 9**

Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport

## **UNIT IV WASTE PROCESSING TECHNOLOGIES 9**

Objectives of waste processing – material separation and processing technologies – biological and chemical conversion technologies – methods and controls of Composting - thermal conversion technologies and energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes - Health considerations in the context of operation of facilities, handling of materials and impact of outputs on the environment

## **UNIT V WASTE DISPOSAL 9**

Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – Rehabilitation of open dumps – landfill remediation – Incineration. Integrated waste management practices- case studies

**TOTAL: 45 hours**

### **Text Books:**

T1: George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, “Integrated Solid Waste Management, Mc-Graw Hill International edition, New York, 1993

### **Reference Books:**

R1: CPHEEO, “Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi, 2000

R2: William A. Worrell, P. Aarne Vesilind, Solid Waste Engineering, Cengage Learning, 2012

R3: John Pichtel, Waste Management Practices, CRC Press, Taylor and Francis Group, 2014

### **Web Links:**

- <https://nptel.ac.in/courses/105106056>
- <https://nptel.ac.in/courses/105103205>
- <https://nptel.ac.in/courses/105105160>

## COURSE OUTCOMES

At the end of this course the students will be able to,

<b>CO 1</b>	Identify the sources and understand the need for solid and hazardous waste management and its regulatory framework	<b>K2</b>
<b>CO 2</b>	Identify the waste characterization and source reduction of waste generation	<b>K2</b>
<b>CO 3</b>	Understand in detail handling, segregation and transportation of waste at source	<b>K2</b>
<b>CO 4</b>	Analyze and select the appropriate waste processing technologies	<b>K4</b>
<b>CO 5</b>	Develop different disposal methods	<b>K3</b>

		<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>22ECV113</b>	<b>PHYSIO-CHEMICAL PROCESSES FOR WATER AND WASTEWATER TREATMENT</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives

- To impart knowledge on the selection criteria of a treatment system and its treatment principles.
- To train the students in the design of municipal and industrial water treatment plants.
- To educate the students on the design and working principles of various types of waste water treatment systems

### **UNIT I INTRODUCTION 5**

Pollutants in water and wastewater – characteristics, Standards for performance - Significance of physico-chemical treatment – Selection criteria-types of reactor- reactor selection-batch continuous type-kinetics

### **UNIT II TREATMENT PRINCIPLES 10**

Physical treatment - Screening – Mixing, Equalization – Sedimentation – Filtration – Evaporation – Incineration – gas transfer – mass transfer coefficient Adsorption – Isotherms – Membrane separation, Reverse Osmosis, Nano filtration, ultra filtration and hyper filtration electro dialysis, distillation – stripping and crystallization – Recent Advances.Principles of Chemical treatment – Coagulation flocculation - stabilization – Disinfection, Ion exchange, Electrolytic methods, Solvent extraction – advanced oxidation /reduction – Recent Trends.

### **UNIT III MUNICIPAL WATER TREATMENT PLANTS 10**

Selection of Treatment – Design of municipal water treatment plant units – Aerators – chemical feeding – Flocculation – clarifier – filters – Rapid sand filters, slow sand filter, pressure filter, Displacement and gaseous type - Flow charts – Layouts – Hydraulic Profile, PID - construction and O&M aspects – case studies, Residue management – Upgradation of existing plants – Recent Trends.

### **UNIT IV INDUSTRIAL WATER TREATMENT PLANTS 10**

Design of Industrial Water Treatment Units- Selection of process – Design of softeners – Demineralizers –Reverse osmosis plants –Flow charts – Layouts –Hydraulic Profile, PID - construction and O&M aspects – case studies, Residue management – Upgradation of existing plants – Treatment of water for boilers and cooling towers - Recent Trends

### **UNIT V WASTEWATER TREATMENT PLANTS 10**

Design of municipal wastewater treatment units-screens-detritors-grit chamber-settling tanks sludge thickening-sludge dewatering systems-sludge drying beds - Design of Industrial Wastewater Treatment Units-Equalization- Neutralization-Chemical Feeding Devices-mixers floatation units-oil skimmer Flow charts – Layouts –Hydraulic Profile, PID, construction and O&M aspects – case studies, Retrofitting - Residue management – Upgradation of existing plants – Recent Trends.

**TOTAL: 45 hours**

**Text Books:**

T1: Metcalf and Eddy, "Wastewater Engineering, Treatment and Reuse", Tata McGraw Hill, New Delhi, IV Edition, 2003

**Reference Books:**

R1: Metcalf and Eddy, "Wastewater Engineering, Treatment and Reuse", Tata McGraw Hill, New

Delhi, IV Edition, 2003

R2: F.R. Spellman, "Hand Book of Water and Wastewater Treatment Plant operations", CRC Press, New York, III Edition, 2013

R3: Lee, C.C. and Shun dar Lin, "Handbook of Environmental Engineering Calculations", McGraw Hill, New York, II Edition, 2007.

R4: Qasim, S.R., Motley, E.M. and Zhu.G, "Water works Engineering – Planning, Design and Operation", Prentice Hall, New Delhi, 2002.

**Web Links:**

- [https://onlinecourses.nptel.ac.in/noc22\\_ch25/preview](https://onlinecourses.nptel.ac.in/noc22_ch25/preview)
- [https://onlinecourses.nptel.ac.in/noc22\\_ce76/preview](https://onlinecourses.nptel.ac.in/noc22_ce76/preview)

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Understand the characteristics of pollutants in water and waste water	<b>K2</b>
<b>CO 2</b>	Demonstrate physical treatment methods	<b>K3</b>
<b>CO 3</b>	Design the municipal water treatment plant units	<b>K4</b>
<b>CO 4</b>	Design the Industrial waste water Treatment Units	<b>K3</b>
<b>CO 5</b>	Design the municipal waste water treatment plant	<b>K3</b>

		<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>21ECV114</b>	<b>ECOLOGICAL ENGINEERING</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

- To impart knowledge on the elements of managing solid wastes from Municipal and industrial sources including the related engineering principles, design criteria, methods and equipment
- To educate the students about the different types of waste disposal techniques.

**UNIT I                      ECOSYSTEMS & ECO TECHNOLOGY                      10**

Aim, scope and applications of ecology – Development and evolution of ecosystems – Principles and concepts pertaining to communities in ecosystem – Energy flow and material cycling in ecosystems – productivity in ecosystems.

**UNIT II                      SYSTEMS APPROACH IN ECOLOGICAL ENGINEERING                      10**

Principles, components and characteristics of systems – Classification of systems – Structural and functional interactions of environmental systems – Environmental systems as energy systems – Mechanisms of steady-state maintenance in open and closed systems – Modelling and eco technology – Elements modeling – Modelling procedure – Classification of ecological models Applications of models in eco technology – Ecological economics.

**UNIT III                      ECOLOGICAL ENGINEERING PROCESSES                      8**

Self-organizing design and processes – Multi seeded microcosms – Interface coupling in ecological systems – Concept of energy – Determination of sustainable loading of ecosystems.

**UNIT IV                      ECO TECHNOLOGY FOR WASTE TREATMENT                      12**

Ecological engineering and ecotechnology – Classification of ecotechnology – Principles of ecological engineering. Eco sanitation-Principles and operation of soil infiltration systems – Wetlands and ponds – source separation systems – Aquacultural systems – Agro ecosystems – Detritus based treatment for solid wastes – Applications of ecological engineering for marine systems.

**UNIT V CASE STUDIES 5**

Case studies of Integrated Ecological Engineering Systems and their commercial prospects.

**TOTAL: 45 Hours**

**Text Books:**

T1: Mitsch, W.J. and S.E. Jorgenson. 2004. Ecological Engineering and Ecosystem Restoration. John Wiley and Sons, Hoboken, New Jersey, 411pp. ISBN: 978-0471332640

T2: Jorgensen, S.E. Ecological Engineering: Principles and Practice. CRC Press, 2003

**Reference Books:**

R1: Mitsch, J.W. and Jorgensen, S.E. Ecological Engineering – An Introduction to Ecotechnology, John Wiley & Sons, New York, 1989

R2: Mitsch, W.J. Ecological Engineering and Ecosystem Restoration, Wiley 2nd Ed., 2003

R3: White I.D., Mottershed, D.N. and Harisson, S.J. Environmental systems – An Introductory text, Chapman Hall, London, 1994

**Web Links:**

➤ [https://onlinecourses.nptel.ac.in/noc19\\_ge23/preview](https://onlinecourses.nptel.ac.in/noc19_ge23/preview)

➤ <https://nptel.ac.in/courses/127105018>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Understand the principles of ecosystem	<b>K2</b>
<b>CO 2</b>	Study Structural and functional interactions of environmental systems	<b>K2</b>
<b>CO 3</b>	Familiarize in the processes in ecological ecosystem	<b>K2</b>
<b>CO 4</b>	Applications of eco Technology in ecological engineering process	<b>K3</b>
<b>CO 5</b>	Understand the Integrated Ecological Engineering Systems	<b>K2</b>

<b>22ECV115</b>	<b>IRRIGATION ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives**

At the end of the course, the students will be able

- To understand the different phases in irrigation practices, Planning and management of irrigation.
- To impart required knowledge on Irrigation storage, distribution systems and Irrigation management.

**UNIT I CROP WATER REQUIREMENT 9**

Need and classification of irrigation- historical development and merits and demerits of irrigation- types of crops-crop season-duty, delta and base period- consumptive use of crops- estimation of Evapotranspiration using experimental and theoretical methods

**UNIT II IRRIGATION METHODS 9**

Tank irrigation – Well irrigation – Irrigation methods: Surface and Sub-Surface and Micro Irrigation-design of drip and sprinkler irrigation – ridge and furrow irrigation-Irrigation scheduling – Water distribution system- Irrigation efficiencies.

**UNIT III DIVERSION AND IMPOUNDING STRUCTURES 9**

Types of Impounding structures - Gravity dam – Forces on a dam -Design of Gravity dams; Earth dams, Arch dams- Diversion Head works - Weirs and Barrages-

**UNIT IV CANAL IRRIGATION 9**

Canal regulations – direct sluice - Canal drop – Cross drainage works-Canal outlets – Design of prismatic canal-canal alignments-Canal lining - Kennedy’s and Lacey’s Regime theory-Design of unlined canal

**UNIT V WATER MANAGEMENT IN IRRIGATION 9**

Modernization techniques- Rehabilitation – Optimization of water use-Minimizing water losses- On form development works-Participatory irrigation management- Water resources associations- Changing paradigms in water management-Performance evaluation-Economic aspects of irrigation

**TOTAL: 45 Hours****TEXTBOOKS:**

T1: Dilip Kumar Majumdar, “Irrigation Water Management”, Prentice-Hall of India, New Delhi, 2008.

T2: Punmia B.C., et. al; Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009

T3: Garg S. K., “Irrigation Engineering and Hydraulic structures”, Khanna Publishers, 23rd Revised Edition, New Delhi, 2009

**REFERENCES:**

R1: Duggal, K.N. and Soni, J.P., “Elements of Water Resources Engineering”, New Age International Publishers, 2005

R2: Linsley R.K. and Franzini J.B, “Water Resources Engineering”, McGraw-Hill Inc, 2000

R3: Chaturvedi M.C., “Water Resources Systems Planning and Management”, Tata McGraw- Hill Inc., New Delhi, 1997.

**Web Links:**

➤ <https://nptel.ac.in/courses/105105168>

➤ <https://nptel.ac.in/courses/105103207>

**COURSE OUTCOMES**

At the end of the course, the students will be able to

<b>CO 1</b>	Estimate duty delta relationship, consumptive needs for irrigation as per national water policy	<b>K5</b>
<b>CO 2</b>	Develop optimization techniques for different methods of irrigation	<b>K3</b>
<b>CO 3</b>	Design of sluices and weirs on permeable and impermeable foundation	<b>K3</b>
<b>CO 4</b>	Analyse the forces acting on dams and prepare elementary profile	<b>K4</b>
<b>CO 5</b>	Design of cross drainage works and river training works	<b>K3</b>

**SYLLABUS**

**PROFESSIONAL ELECTIVE**

**BLENDED COURSES**



<b>22ECV201</b>	<b>DESIGN OF STEEL STRUCTURES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>

### Course Objectives

- To determine safe as well as economical steel section for various industrial and framed structures.
- To learn the design of steel structures using Limit state method as per codal provision IS 800-2007.

### **UNIT I INTRODUCTION 9**

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures– Connections using rivets, welding, bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints.

### **UNIT II TENSION MEMBERS 9**

Tension members – types of failure of tension members- Yielding failure – Rupture failure. Types of sections – Net cross sectional area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

### **UNIT III COMPRESSION MEMBERS 9**

Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of lacing and battening type columns – Design of column bases – Gusseted base.

### **UNIT IV BEAMS AND PLATE GIRDERS 9**

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices.

### **UNIT V PLASTIC ANALYSIS 9**

Statically indeterminate structures – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism. Static and Kinematic methods – Upper and lower bound theorems -Plastic analysis of indeterminate beams and frames.

### List of Exercises

1. Draw the layout of different types of Rivet connections.
2. Draw the neat sketch of staggered joints and show pitch, gauge and edge distance.
3. Draw the plan and elevation of tension splice.
4. Design the lacing and battening type columns
5. Draw the plan and elevation of slab base.
6. Draw the plan and elevation of Gusset base

**TOTAL: 45 + 15 Hours**

### Text Books:

- T1: Dayaratnam, P., —Design of Steel Structures, Second edition, S. Chand & Company, 2007.
- T2: Ramachandra, S. and VirendraGehlot, —Design of Steel Structures – Vol. I & III, Standard Publication, New Delhi, 2010.
- T3: Subramanian. N, "Design of Steel Structures", Oxford University Press, New Delhi, 2017.

**Reference Books:**

- R1: Teaching Resources for Structural Steel Design – Vol. I & III, INSDAG,14th Edition, Kolkatta.
- R2: Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., —Design of Steel Structures, 3rd edition, McGraw-Hill Publications, 1992
- R3: IS 800-2007 Indian Standard - General Construction in Steel – code of practice (3rd Revision).
- R4: Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013
- R5: Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company,2015

**Web Links:**

- <https://nptel.ac.in/courses/115102102>
- <https://nptel.ac.in/courses/108106111>
- <https://nptel.ac.in/courses/1221060152>

**COURSE OUTCOMES**

At the end of this course the students will be able to,

<b>CO 1</b>	Gain knowledge on limit state design concepts and joints	<b>K2</b>
<b>CO 2</b>	Understand the design of tension members for axial loading in braced system and unbraced system	<b>K2</b>
<b>CO 3</b>	Analyze the distribution of axial force on gusset and column base plate in bracing and column joints	<b>K3</b>
<b>CO 4</b>	Design the laterally supported and unsupported beams	<b>K3</b>
<b>CO 5</b>	Understand the concepts plastic analysis of structures	<b>K2</b>

**22ECV202 TRAFFIC ENGINEERING AND MANAGEMENT**      **L T P Credits**  
**3 0 2 4**

**COURSE OBJECTIVE: (Employability)**

- To familiarize concepts on traffic engineering and to provide exposure on various traffic control measures.
- To understand the design requirements of rotary and intersections

**UNIT I INTRODUCTION 9**

Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics, Impact of gadgets on road user behavior

**UNIT II TRAFFIC SURVEYS AND ANALYSIS 9**

Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

**UNIT III TRAFFIC CONTROL 9**

Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

**UNIT IV GEOMETRIC DESIGN OF INTERSECTIONS 9**

Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections - Principles of Intersection Design, Elements of Intersection Design, Rotary design, Grade Separation and interchanges - Design principles.

**UNIT V TRAFFIC MANAGEMENT****9**

Traffic Management- Transportation System Management (TSM) - Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).

**List of Exercises**

1. Perform speed study and infer the vehicle speed distribution
2. Conduct a traffic volume study on a road and categorize the traffic volume
3. Perform a questionnaire survey among students for O-D study and compile the results
4. Draw the parking layout for a facility with the aid of parking inventory study
5. Identify the dark spots on the road and tabulate the reasons why accidents are repeatedly occurring at these spots
6. Develop a pedestrian questionnaire for improving an existing pedestrian facility

**TOTAL: 45 +15 Hours****TEXT BOOKS:**

1. Kadiyali L R, “Traffic Engineering and Transport Planning”, Khanna Technical Publications, Delhi, 2008.
2. Khanna K and Justo C E G, “Highway Engineering”, Khanna Publishers, Roorkee, 2001.

**REFERENCE BOOKS:**

1. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
2. Guidelines of Ministry of Road Transport and Highways, Government of India.
3. Subhash C.Saxena,” A Course in Traffic Planning and Design”, Dhanpat Rai Publications, New Delhi, 1989.

**WEBLINKS:**

- <https://www.irc.nic.in/>
- <https://morth.nic.in/manual-roads-wing>
- <https://ascelibrary.org/journal/jtepbs>
- <https://ascelibrary.org/journal/jhtrcq>

**COURSE OUTCOME**

At the end of the course the students will be able to

<b>CO 1</b>	Interpret the impact of various factors on road user behavior	<b>K2</b>
<b>CO 2</b>	Survey the existing facility for various traffic parameters and analyze the traffic data	<b>K4</b>
<b>CO 3</b>	Apply the results of the traffic studies and suggest measures for improving the existing facility	<b>K4</b>
<b>CO 4</b>	Design traffic signal system based on traffic volume count	<b>K3</b>
<b>CO 5</b>	Compare and select the best suited traffic management measure based on the site requirements	<b>K4</b>

**SYLLABUS  
OPEN ELECTIVE COURSES  
(MANAGEMENT)**

## **22ECV151 ORGANIZATIONAL BEHAVIOUR**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **Course Objectives (Employability):**

- To gain an idea on the roles played by individuals and groups in an organizational setup
- To understand the importance traits of leadership
- To familiarize the dynamics of work setup in an organization

### **UNIT I FOCUS AND PURPOSE**

**5**

Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models.

### **UNIT II INDIVIDUAL BEHAVIOUR**

**12**

Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification. Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

### **UNIT III GROUP BEHAVIOUR**

**10**

Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building- Interpersonal relations – Communication – Control.

### **UNIT IV LEADERSHIP AND POWER**

**8**

Meaning – Importance – Leadership styles – Theories – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

### **UNIT V DYNAMICS OF ORGANIZATIONAL BEHAVIOUR**

**10**

Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives – Organizational effectiveness

**TOTAL: 45 Hours**

### **TEXT BOOKS**

1. Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 11<sup>th</sup> edition, 2008.
2. Fred Luthans, Organisational Behavior, McGraw Hill, 11<sup>th</sup> Edition, 2001.

### **REFERENCES**

1. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 9<sup>th</sup> Edition, 2008.
2. Udai Pareek, Understanding Organisational Behaviour, 2<sup>nd</sup> Edition, Oxford Higher Education, 2004.
3. Mc Shane & Von Glinov, Organisational Behaviour, 4<sup>th</sup> Edition, Tata Mc Graw Hill, 2007.
4. Hellrigan, Slocum and Woodman, Organisational Behavior, Cengage Learning, 11<sup>th</sup> Edition 2007.
5. Ivancevich, Konopaske & Maheson, Organisational Behaviour & Management, 7<sup>th</sup> edition, Tata McGraw Hill, 2008.

**WEBLINKS:**

1. <https://open.umn.edu/opentextbooks/textbooks/30>
2. <https://old.mu.ac.in/wp-content/uploads/2014/04/Management-PAPER-II-Organizational-Behavior-final-book.pdf>
3. [https://en.wikipedia.org/wiki/Organizational\\_behavior](https://en.wikipedia.org/wiki/Organizational_behavior)

**COURSE OUTCOMES (COs):**

At the end of the course, the student will be able to

<b>CO 1</b>	Understand the various theories of behavior and behavior modifications	<b>K2</b>
<b>CO 2</b>	Infer the effects of values, attitudes, perceptions and perceptions on work behavior	<b>K2</b>
<b>CO 3</b>	Relate to the decision making process of group based on the group dynamics	<b>K2</b>
<b>CO 4</b>	Compare the role of leadership and the power associated with it	<b>K2</b>
<b>CO 5</b>	Outline the factors influencing the work-life balance and adapt to the various organizational changes	<b>K2</b>

<b>22ECV152 TOTAL QUALITY MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVE: (Employability)**

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.

**UNIT I INTRODUCTION 9**

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

**UNIT II TQM PRINCIPLES 9**

Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention – Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen – Supplier, partnership – Partnering, Supplier selection, Supplier Rating.

**UNIT III TQM TOOLS & TECHNIQUES I 9**

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

**UNIT IV TQM TOOLS & TECHNIQUES II 9**

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

**UNIT V QUALITY SYSTEMS 9**

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM, implementation in manufacturing and service sectors including IT.

**TOTAL: 45 Hours**

**TEXT BOOKS:**

1. Dale H. Besterfield, et al., “Total Quality Management”, Pearson Education Asia, 3rd Edition, Indian Reprint (2006).

**REFERENCE BOOKS:**

1. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, 6<sup>th</sup> Edition, South-Western (Thomson Learning), 2008.
2. Oakland, J.S., “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2012.
3. Suganthi, L and Anand Samuel, “Total Quality Management”, Prentice Hall (India) Pvt. Ltd., 2006.
4. Janakiraman, B and Gopal, R.K, “Total Quality Management – Text and Cases”, Prentice Hall (India) Pvt. Ltd., 2006.

**WEBLINKS:**

1. <https://www.educba.com/total-quality-management-notes/>
2. [https://www.academia.edu/37213047/TOTAL\\_QUALITY\\_MANAGEMENT\\_notes](https://www.academia.edu/37213047/TOTAL_QUALITY_MANAGEMENT_notes)

**COURSE OUTCOMES:**

At the end of the course, the student will be able to

<b>CO 1</b>	Understand the concepts of TQM through the contributions of various experts	<b>K2</b>
<b>CO 2</b>	Develop continuous improvement process tools based on the need	<b>K3</b>
<b>CO 3</b>	Understand the concept and application of six sigma	<b>K2</b>
<b>CO 4</b>	Identify the tools required for manufacturing process and reasons for bench mark	<b>K2</b>
<b>CO 5</b>	Make use of QFD and codal provisions associated with quality systems	<b>K3</b>

**22ECV153****E- COMMERCE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVE: (Entrepreneurship)**

- To understand the nature of E-Commerce and recognize the business impact and potential of E-Commerce.
- To explain the technologies required to make E-Commerce viable and gain knowledge about the current drivers and inhibitors facing the business world in adopting and using E-Commerce.
- To make them aware of the economic consequences of E-Commerce.

**UNIT I INTRODUCTION****9**

Traditional commerce and Ecommerce - Categories of Electronic commerce – Business models – Revenue models – Business processes. Internet and WWW–role of WWW–value chains–strategic business – Revenue Strategy issues – Industry value chains - supply chain management–role of Ecommerce.

**UNIT II INFRASTRUCTURE FOR E COMMERCE****9**

Packet switched networks–Routing packets. TCP/IP protocol script: IP Addressing – Domain names – E-mail protocols. Internet utility programs–SGML, HTML and XML–web client and servers–Web client/server architecture– intranet and extranets – Public and private networks – Virtual private network.

**UNIT III WEB BASED TOOLS FOR E-COMMERCE****9**

Web server: Server computers –performance evaluation – Hardware architectures. Web server software feature sets–web server software and tools–Internet Utility programs – Data analysis software – Link checking utilities. web protocol–search engines–intelligent agents –EC

software– webhosting–cost analysis.

#### **UNIT IV SECURITY**

**9**

Computer security classification–copyright and Intellectual property–electronic commerce threats: Secrecy threats – Integrity threats – Necessity threats Encryption solutions. Protecting client computers–electronic payment systems– electronic cash–strategies for marketing–sales and promotion–cryptography – authentication.

#### **UNITV INTELLIGENT AGENTS**

**9**

Definition and capabilities–limitation of agents – History of software agents – Characteristics and properties a of agents – Tele script Agent Language – safe-Tcl –security–web based marketing– search engines and Directory registration–online advertisements– Portable sand info mechanics–website design issues.

**TOTAL: 45 Hours**

#### **TEXT BOOKS:**

1. Ravi Kalakota, Andrew B. Whinston“frontiers of Electronic Commerce”,Pearson Education, 2008.
2. Gary P Schneider “Electronic commerce”, Thomson learning &James T PenyCambridge USA, 2001.
3. ManlynGreenstein and Miklos “Electronic commerce” McGraw-Hill, 2002.

#### **REFERENCE BOOKS:**

1. Efraim TurvanJ. Lee, David kugandchung, “Electronic commerce” PearsonEducationAsia2001.
2. Brenda Kienew Ecommerce Business Prentice Hall, 2001.

#### **WEBLINKS:**

1. [https://www.iare.ac.in/sites/default/files/lecture\\_notes/IARE\\_E-Commerce\\_Lecture\\_Notes.pdf](https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_E-Commerce_Lecture_Notes.pdf)
2. <https://www.techtargget.com/searchcio/definition/e-commerce>
3. <https://cyber.harvard.edu/olds/ecommerce/library.html>

#### **COURSE OUTCOMES:**

At the end of the course the students will be able to

<b>CO 1</b>	Understand the advantages of ecommerce over traditional business	<b>K2</b>
<b>CO 2</b>	Illustrate various infrastructure approaches and techniques for E-business and management	<b>K2</b>
<b>CO 3</b>	Acquire knowledge on encryption solutions and cryptography	<b>K2</b>
<b>CO 4</b>	Identify the threats arising out of network and suggest corrective measures	<b>K2</b>
<b>CO 5</b>	Understand the role of agents in e-commerce and their limitations	<b>K2</b>



**SYLLABUS**  
**OPEN ELECTIVE COURSES**  
**(TECHNICAL)**

<b>22ECV154 GLOBAL WARMING AND CLIMATE CHANGE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVE: (Employability)**

- To clearly understand the causes of global warming.
- To develop idea of weather and climate.
- To understand how the global warming have impacts on people and nature.
- To learn to save energy and to develop alternative sources of energy.

**UNIT I EARTH'S CLIMATE SYSTEM 9**

Role of ozone in environment-ozone layer-ozone depleting gases-Green House Effect, Radioactive Effects of Greenhouse Gases-The Hydrological Cycle-Green House Gases and Global Warming – Carbon Cycle.

**UNIT II ATMOSPHERE AND ITS COMPONENTS 9**

Importance of Atmosphere-Physical Chemical Characteristics of Atmosphere- Vertical structure of the atmosphere-Composition of the atmosphere-Atmospheric stability-Temperature profile of the atmosphere-Lapse rates-Temperature inversion-effects of inversion on pollution dispersion.

**UNIT III IMPACTS OF CLIMATE CHANGE 9**

Causes of Climate change : Change of Temperature in the environment-Melting of ice Pole-sea level rise-Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.

**UNIT IV OBSERVED CHANGES AND ITS CAUSES 9**

Climate change and Carbon credits- CDM- Initiatives in India-Kyoto Protocol- Intergovernmental Panel on Climate change- Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC –Evidences of Changes in Climate and Environment – on a Global Scale and in India .

**UNIT V CLIMATE CHANGE AND MITIGATION MEASURES 9**

Clean Development Mechanism –Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India and Adaptation funding. Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry - Carbon sequestration – Carbon capture and storage (CCS)- Waste (MSW & Bio waste, Biomedical, Industrial waste – International and Regional cooperation.

**TOTAL: 45 Hours**

**TEXT BOOKS:**

1. Dash Sushil Kumar, “Climate Change – An Indian Perspective”, Cambridge University Press India Pvt. Ltd, 2007.

**REFERENCE BOOKS:**

1. Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press, Cambridge, 2006.
2. Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
3. Jan C. van Dam, Impacts of “Climate Change and Climate Variability on Hydrological Regimes”, Cambridge University Press, 2003.

**WEB LINKS:**

1. <https://climate.nasa.gov/resources/global-warming-vs-climate-change/>
2. <https://www.nrdc.org/stories/global-warming-101>
3. <https://www.globalissues.org/article/233/climate-change-and-global-warming-introduction>

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

<b>CO 1</b>	Understand the physical basis of natural greenhouse effect, carbon cycle and the hydrological cycle	<b>K2</b>
<b>CO 2</b>	Analyze the impact of climate change on the environment	<b>K3</b>
<b>CO 3</b>	Identify the irreversible losses and the extent of damage caused by these losses	<b>K2</b>
<b>CO 4</b>	Relate to the various protocols followed in India and world	<b>K2</b>
<b>CO 5</b>	Summarize the mitigation measures to be taken to handle the climate change	<b>K2</b>

**22ECV155 PUBLIC TRANSPORTATION SYSTEM**

**L T P Credits**  
**3 0 0 3**

**COURSE OBJECTIVE (Employability):**

- To identify the role of various modes of Mass Transportation like Bus and Rail and its Planning and Management
- To gain knowledge on various transit systems like bus, rail and air

**UNIT I TRANSIT SYSTEM AND ISSUES 7**

Introduction to Mass Transport – Role of various modes of Mass Transport – Problems and their Impact – Transport System Performance at National, State, Local and International levels – National Transport Policy

**UNIT II PUBLIC TRANSIT SYSTEM 9**

Urban Transport System – Public Transport System Re-gensis and Technology – Problems and issues faced by Public Transport System – Public Transport and Urban Development Strategies - Feeder Routes–IntermediatePublic Transport.

**UNIT III URBAN RAIL TRANSIT 9**

Transit and Rail Tunnels- MRTS – LRTS, Metro Rail – Monorail – High speed trains- cable railway system for steep gradients- Tubular Rail-Tramways- Case Studies

**UNIT IV AIRPORT AND AIR TRANSIT 10**

Planning of airports and its impact on metropolitan city development– Accessibility – Transport Connections – Road and Rail, Expansion – Feasibility Studies – Environmental and Social Issues –Forecasting Future Traffic – Airfield Capacity and Delay - Aircraft characteristics – Airport Site Selection

**UNIT V IMPACT OF TRANSIT 10**

Policies and Strategies for Mass Transport – Need for Integrated Approach – Unified TransportAuthorities – Institutional arrangement – Urban Transport Fund – Parking Policies - Private Sector inMass Transport – Bus and Rail Integration – Co-ordination of Feeder Services – Transit OrientedLand Use Development – Case Studies - Urban Transportation and Land use – Impact of TransportDevelopment on Environment – Remedial measures – Policy Decisions –

**TOTAL: 45 Hours****TEXT BOOKS:**

1. C.J. Khisty and B.K. Lall, "Transportation Engineering – An Introduction", Prentice Hall of India Pvt. Ltd., 2002.
2. L.R. Kadiyali, "Traffic Engineering and Transport Planning, Khanna Publishers", New Delhi, 2000

**REFERENCE BOOKS:**

1. C. S. Papacostas and P. D. Prevedouros, "Transportation Engineering and Planning", Prentice Hall of India Pvt. Ltd., 2001
2. Michael J. Bruton, "An Introduction to Transportation Planning", Hutchinson, 1985
3. G. E. Gray and L. A. Hoel, "Public Transportation", Prentice Hall, New Jersey, 1992
4. Paul H. Wright, "Transportation Engineering – Planning and Design", John Wiley and Sons, New York, 1989.

**WEBLINKS:**

1. <https://www.intelligenttransport.com/transport-articles/21458/city-public-transportation-india/>
2. <https://www.government.nl/topics/mobility-public-transport-and-road-safety/public-transport/types-of-public-transport>
3. <https://www.statista.com/topics/8005/urban-public-transport-in-india/>

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

<b>CO 1</b>	Relate to the problems faced in public transportation and summarize NTP	<b>K2</b>
<b>CO 2</b>	Understand the importance of planning strategies in mitigating the public bus transit	<b>K2</b>
<b>CO 3</b>	Compare the rail and air transit and infer the possibilities of implementing it in a city	<b>K2</b>
<b>CO 4</b>	Develop a framework for integrating various public transit systems	<b>K3</b>
<b>CO 5</b>	Relate to the policy changes and reduction in environmental damage due to the policy change	<b>K2</b>

**22ECV156 PRINCIPLES OF ARCHITECTURE**

L	T	P	Credits
3	0	0	3

**COURSE OBJECTIVE: (Employability)**

- To provide the basic knowledge on the principles of design of buildings relating to the environment and climate

**UNIT I ARCHITECTURAL DESIGN****9**

Introduction to basic elements and principles of design Introducing concepts of culture and civilization – Paleolithic and Neolithic Culture – art forms and evolution of shelter – megaliths – agricultural revolution and its impact on culture and civilization - vernacular and traditional architecture - .Architectural Design – an analysis – integration of function and aesthetics.

**UNIT II SITE PLANNING****9**

Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts. Functional requirements of building and its components, introduction to concept of load bearing and framed structures. Exercises – involving the same

**UNIT III BUILDING TYPES****9**

Residential, institutional, commercial and Industrial – Application of anthropometry and space standards-Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior design

**UNIT IV CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN 9**

Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

**UNIT V TOWN PLANNING 9**

Planning – Definition, concepts and processes- Urban planning standards and zoning regulations- Urban renewal – Conservation – Principles of Landscape design - Introduction to city types, characteristics of city form and function, Planning theories, Land use and transportation planning, challenges of urbanization and population, slums and squatters, infrastructure for the urban centers.

**TOTAL: 45 Hours**

**TEXT BOOKS:**

1. Francis D.K. Ching, “Architecture: Form, Space and Order”, VNR, N.Y., 1999.
2. Givoni B., “Man Climate and Architecture”, Applied Science, Barking ESSEX, 1982
3. Edward D. Mills, “Planning and Architects Handbook”, Butterworth London, 1995.

**REFERENCE BOOKS:**

1. Gallian B. Arthur and Simon Eisner, “The Urban Pattern – City Planning and Design”, Affiliated Press Pvt. Ltd., New Delhi, 1995.
2. Margaret Robert, “An Introduction to Town Planning Techniques”, Hutchins London 1990.

**WEBLINKS:**

1. <https://k-render.com/7-basic-architectural-design-principles-every-architect-must-know/>
2. <https://pubs.opengroup.org/architecture/togaf8-doc/arch/chap29.html>
3. <https://ec.europa.eu/research/participants/documents/downloadPublic/NnN1c3dsRXZ4MnA1V21vdEJQTjVBekpDQ01iVUNsYUdKZ05KeHd6a2pWR2hyYIVOVitBaW5RPT0=/attachment/VFEyQTQ4M3ptUWQyTTErRGVPNjFQMHB6ZXhIUHNhcTQ=>

**COURSE OUTCOMES:**

<b>CO 1</b>	Understand about the integration of function and aesthetics in architecture	<b>K2</b>
<b>CO 2</b>	Understand the layout regulations and layout design concepts in site planning	<b>K2</b>
<b>CO 3</b>	Understand anthropometry and acquire knowledge on interior designing and safety regulations in buildings	<b>K2</b>
<b>CO4</b>	Design buildings such that it integrates climate and buildings with environment	<b>K3</b>
<b>CO 5</b>	Understand the concepts of urban standards for town planning and challenges to urbanization and population	<b>K2</b>

**22ECV157 AIR POLLUTION MANAGEMENT**

**L T P Credits**  
**3 0 0 3**

**COURSE OBJECTIVE: (Employability)**

- This subject covers the sources, characteristics and effects of air and noise pollution and the methods of controlling the same
- The student is expected to know about source inventory and control mechanism

**UNIT I SOURCES AND EFFECTS OF AIR POLLUTANTS 9**

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

**UNIT II DISPERSION OF POLLUTANTS 9**

Fundamentals of meteorology – Wind roses – Atmospheric stability Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate – Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

**UNIT III AIR POLLUTION CONTROL 9**

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

**UNIT IV AIR QUALITY MANAGEMENT 9**

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts– Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

**UNIT V NOISE POLLUTION 9**

Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psycho-acoustics and noise criteria, effects of noise on health, annoyance rating schemes; special noise environments: Infra-sound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices.

**TOTAL: 45 Hours**

**TEXT BOOKS:**

1. Anjaneyulu, D., “Air Pollution and Control Technologies”, Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N. and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.

**REFERENCE BOOKS:**

1. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New York, 1997.
2. Garg, S.K., “Environmental Engineering Vol. II”, Khanna Publishers, New Delhi
3. Mahajan, S.P., “Pollution Control in Process Industries”, Tata McGraw-Hill, New Delhi, 1991

**WEBLINKS:**

1. <https://byjus.com/biology/air-pollution-control/>
2. [https://www.researchgate.net/publication/327136390\\_AIR\\_POLLUTION\\_MANAGEMENT](https://www.researchgate.net/publication/327136390_AIR_POLLUTION_MANAGEMENT)
3. [https://www.researchgate.net/publication/279202084\\_Causes\\_Consequences\\_and\\_Control\\_of\\_Air\\_Pollution](https://www.researchgate.net/publication/279202084_Causes_Consequences_and_Control_of_Air_Pollution)

**COURSE OUTCOME:**

At the end of the course, the student will be able to

<b>CO 1</b>	Understand the structure and composition of atmosphere, sources, effects	<b>K2</b>
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	and classification of air pollutants	
<b>CO 2</b>	Draw a windrose diagram for dispersion of pollutants	<b>K3</b>
<b>CO 3</b>	Interpret the various air pollution control measures	<b>K2</b>
<b>CO 4</b>	Understand the concepts of air quality management and air quality legislations	<b>K2</b>
<b>CO 5</b>	Identify the appropriate noise instrumentation and monitoring procedure for various noises	<b>K2</b>

## **22ECV158 INTELLECTUAL PROPERTY RIGHTS**

**L T P Credits**  
**3 0 0 3**

### **COURSE OBJECTIVE: (Entrepreneurship)**

- To protect the rights of the University, its innovators, inventors, research sponsors and the public
- To eliminate the infringement, improper exploitation and abuse of the University's intellectual assets belonging to the University or the other persons
- To optimize the environment and incentives for research and for the creation of new knowledge

### **UNIT I INTRODUCTION 9**

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance –Need for IPR- Protection of IPR -IPR in India – Genesis and Development IPR in abroad - some important examples of IPR – Basic types of property: Movable Property - Immovable Property and - Intellectual Property- Competing Rationales for Protection of Intellectual Property Rights

### **UNIT II APPLICATIONS OF IP 9**

IP – Patents-Procedure for Opposition- Revocation of Patents - Ownership and Maintenance of Patents- Assignment and licensing of Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits –Protection of Geographical Indications at national and International levels – Application Procedures -

### **UNIT III IP ESSENTIALS 9**

International convention relating to Intellectual Property – Establishment of WIPO –Mission and Activities – History – General Agreement on Trade and Tariff (GATT) –TRIPS Agreement- Copyright and Related Rights- Trademarks - Geographical Indications - Industrial Designs - Layout-Designs (Topographies) of Integrated Circuits - Protection of Undisclosed-The text of the TRIPS Agreement.

### **UNIT IV GLOBAL PERSPECTIVE 9**

Indian Position Vs WTO and Strategies – Economics of intellectual property-Other intellectual property conventions -Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy –Present against unfair competition-TRIPS work in the WTO - WTO bodies - IPR Enforcement - Global Value of Digital Piracy.

### **UNIT V TRENDS IN IP 9**

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications– Protection against unfair competition- India's IP regime –Development- Legislation- International Searching Authority and International Preliminary Examining Authority- IPR on Internet.

**TOTAL: 45 Hours**

**TEXT BOOKS:**

1. Subbaram N.R. “Handbook of Indian Patent Law and Practice “, S. Viswanathan Printers and Publishers Pvt. 3<sup>rd</sup> Edition 2006.

**REFERENCE BOOKS:**

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000.

**WEBLINKS**

- <https://ipindia.gov.in/patents.htm>
- [https://uk.practicallaw.thomsonreuters.com/0-610-9089?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/0-610-9089?transitionType=Default&contextData=(sc.Default)&firstPage=true)
- <https://kapila.mic.gov.in/>

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

<b>CO 1</b>	Understand the assets that fall under Intellectual property rights	<b>K2</b>
<b>CO 2</b>	Interpret the different terms under intellectual property rights like patents, trademarks etc	<b>K2</b>
<b>CO 3</b>	Understand the IP essentials and TRIPS agreement	<b>K2</b>
<b>CO 4</b>	Infer the protection under WTO patent ordinance	<b>K2</b>
<b>CO 5</b>	Acquire knowledge on Indian IP regime and process of examining the patents	<b>K2</b>

<b>22ECV159</b>	<b>PRINCIPLES OF MANAGEMENT &amp; PROFESSIONAL ETHICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVE: (Employability)**

- Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations.
- After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling.
- Students will also gain some basic knowledge on international aspect of management.

**UNIT I OVERVIEW OF MANAGEMENT 9**

Definition - Management - Role of managers - Evolution of Management thought – Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.

**UNIT II PLANNING & ORGANIZING 9**

Nature and purpose of planning and Organizing - Planning process - Types of plans – Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions. - Organization structure - Formal and informal groups I organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - Performance Appraisal.



**UNIT III DIRECTING & CONTROLLING 9**

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication – Organization Culture - Elements and types of culture - Managing cultural diversity. Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.

**UNIT IV ENGINEERING ETHICS & HUMAN VALUES 9**

Definition - Societies for engineers – Code of Ethics – Ethical Issues involved in cross border research - Ethical and Unethical practices – case studies – situational decision making - Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

**UNIT V SAFETY RESPONSIBILITIES AND RIGHTS 9**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination – Global issues - Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

**TOTAL: 45 Hours**

**TEXT BOOKS:**

1. Stephen P. Robbins and Mary Coulter, “Management”, Prentice Hall of India, 8th edition, 2010.
2. Charles W L Hill, Steven L McShane, “Principles of Management”,Mcgraw Hill Education, Special Indian Edition, 2007.
3. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2005.

**REFERENCE BOOKS:**

1. Hellriegel, Slocum & Jackson, “Management - A Competency Based Approach”, Thomson South Western, 10th edition, 2007.
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, “Management - A global & Entrepreneurial Perspective”, Tata Mcgraw Hill, 12th edition, 2007.
3. Andrew J. Dubrin, “Essentials of Management”, Thomson Southwestern, 7th edition, 2011.
4. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.

**WEBLINKS:**

1. <https://www.iaa.govt.nz/for-advisers/adviser-tools/ethics-toolkit/professional-ethics-and-codes-of-conduct/>
2. <https://ethics.iit.edu/teaching/professional-ethics>
3. <https://www.toolshero.com/management/14-principles-of-management/>
4. [https://www.managementstudyguide.com/management\\_principles.htm](https://www.managementstudyguide.com/management_principles.htm)

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

<b>CO 1</b>	Understand the planning and organizing system of the management	<b>K2</b>
<b>CO 2</b>	Infer the management framework of a company	<b>K2</b>
<b>CO 3</b>	Understand the direction and controlling system of the management	<b>K2</b>



4. <https://citizenmatters.in/tips-from-a-citizen-for-environment-sustainability-reduce-reuse-recycle-5567>

**COURSE OUTCOMES:**

<b>CO1</b>	Understand the implementation of environmental conservation techniques such as therain water harvesting, energy conservation, waste land development and afforestation	<b>K2</b>
<b>CO2</b>	Create awareness about disaster management and mitigation methods in the society	<b>K3</b>
<b>CO3</b>	Realize the importance of the role of youth in project management and implementation of societal activities	<b>K2</b>
<b>CO4</b>	Infer knowledge on data analysis and collection and learn about project monitoring and dissemination of reports	<b>K2</b>
<b>CO5</b>	Understand the need for concern for environment, disaster management and waste management in the current scenario with respect to global circumstances	<b>K2</b>

# **SYLLABUS**

## **EMPLOYMENT ENHANCEMENT COURSES**

**COURSE OBJECTIVES:**

- To nurture and develop winning personalities and eventually leading them to become dynamic and socially responsible leaders

**UNIT I SOFT SKILLS I 6**

Introduction to Personality Development – Meaning–Features of personality – Dimensions of Personality Determinants of Personality–Features and Traits– Components of self concept– Barriers–Self analysis

**UNIT II SOFT SKILLS II 6**

Importance of Soft Skills – First impression–Work Place requirements–Discipline –Cleanliness Hygiene –general Appearance—Building Confidence—Concept of Thinking and Usage –Value of Time–Focus & Commitment.

**UNIT III SOFT SKILLS IN ACTION 6**

Grooming – Attire – Understanding others– Stability & Maturity Development – Strength s – Weakness – Opportunities–threats – Merits of SWOT Analysis – Components – how to convert weakness into strengths – Goal settings

**UNIT IV SELF AWARENESS AND SELF ESTEEM 6**

Definitions – Components of Self awareness – Developing Self awareness – Self esteem – meaning –Steps to improve self esteem.

**UNIT V SELF MOTIVATION 6**

Motivation – Meaning –Techniques of self motivation–Motivation & goal setting – Motivation and emotion – Motivation at work.

**TOTAL: 30 Hours****TEXT BOOKS:**

1. Personality Development And Soft Skills Barun K Mitra, Oxford Publication
2. Seven habits of Highly Effective people – Stephen R. Covey

**REFERENCE BOOKS:**

1. Emotion, motivation and Self regulation – Nathan C. Hall, McGill University, Canada  
Thomas Goetz, University of Konstanz, Germany  
<http://www.emeraldgroupublishing.com>.
2. Psychology of Self esteem – Nathaniel Branden, Nash (1st edition), Jossey – Bass (32 nd anniversary edition)

**WEBLINKS:**

- <https://www.educations.com/articles-and-advice/soft-skills-you-need-to-get-ahead-14193>

**COURSE OUTCOMES**

At the end of the course, the student will be able to

<b>CO1:</b>	Discuss the features, dimensions and determinants of personality	<b>K2</b>
<b>CO2:</b>	Make a good first impression in professional and other situations	<b>K3</b>
<b>CO3:</b>	Demonstrate confidence, punctuality and commitment as an engineer	<b>K3</b>
<b>CO4:</b>	Set goals for development using SWOT analysis	<b>K5</b>
<b>CO5:</b>	Develop self-awareness and improve self esteem	<b>K3</b>

22EPD102

**PERSONALITY DEVELOPMENT II**

L	T	P	Credits
2	0	0	2

**UNIT I                      SOFT SKILLS                      III                      6**

Basic Etiquette – Email etiquette – Business etiquette – Telephone etiquette – Meeting etiquette – Adjustment of Role & Leadership – Team Management & Development

**UNIT II                      QUANTITATIVE APTITUDE I                      6**

Percentage – Profit Loss –Discount – Ratio Proportion – Time & Work – Time, Speed & Distance. Problems relating to ages– Permutation & Combination–Probability

**UNIT III                      QUANTITATIVE APTITUDE II                      6**

Mensuration – Clocks and Calendars – Boats – Simple Interest – Compound Interest – Fractions and Decimals – Square roots – Functions.

**UNIT IV                      ANALYTICAL PROBLEMS                      6**

Introduction – Linear Sequencing – Seating Arrangements – Distribution/Double Line Up – Selection – Ordering and Sequencing – Binary Logic – Venn Diagrams –Directions.

**UNIT V                      LOGICAL PROBLEMS                      6**

Introduction to Logical problems – Cause and Effect – Course of Action – Statement and Assumption – Letter and Symbol series – Analogies.

**TOTAL: 45Hours**

**TEXT BOOKS:**

- T1. K. R. Dhanalakshmi and N S Raghunathan, Personality Enrichment, Margham Publications, 2012
- T2. R. S. Agarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publishers, 2017

**REFERENCE BOOKS:**

- R1. D. P. Sabharwal, Personality Development Handbook, Fingerprint publishing, 2021
- R2. A.K Gupta, Logical and Analytical Reasoning (English), Ramesh Publishing House, 2022

**WEBLINKS:**

- <https://www.talentlyft.com/en/resources/what-is-aptitude-and-ability-tests>
- <https://www.zippia.com/advice/logical-thinking-skills/>
- <https://www.cleverism.com/skills-and-tools/logical-thinking/>

## COURSE OUTCOMES

At the end of the course, the student will be able to

<b>CO1:</b>	Discuss the basic, email, business, telephone and meeting etiquettes.	<b>K2</b>
<b>CO2:</b>	Solve problems on ratio proportion related to profit and loss, discounts, time and work, Time, speed and distance.	<b>K3</b>
<b>CO3:</b>	Work with fractions, decimals and square roots.	<b>K3</b>
<b>CO4:</b>	Analyze the cause, effect and course of action in logical problems.	<b>K4</b>
<b>CO5:</b>	Solve problems on the letter and symbol series.	<b>K3</b>

**22EPD103 PERSONALITY DEVELOPMENT III** **L T P Credits**  
**2 0 0 2**

### COURSE OBJECTIVE:

- To enhance the communication, interpersonal, group skills.

### UNIT I VERBAL APPTITUDE I 6

Phonetics / Neutral Accent / Pronunciation – Speech Mechanism / Mouth & Face Exercise – Vowels & Consonants – Sounds – Syllable and Syllable Stress/ Word Stress – Sentence Stress & Intonation Articulation Exercise – Rate of Speech / Flow of Speech / Idiomatic Phrases.

### UNIT II VERBAL APTITUDE II 6

Singular/plural – present tense / past tense – genders Prepositions – conjunctions – Choice of words –simple sentences – compound sentences – summarizing phrases Synonyms – Antonyms – Analogies –Similar Words.

### UNIT III SOFT SKILLS 6

Attitude – Meaning–Features of attitude – Formation – Personality Factors –Types of attitude – change in attitude – developing Positive attitude.

### UNIT IV TIME MANAGEMENT 6

Definition – Meaning–Importance, Value of time as an important resource – comparison of Time and Money – Circle of influence and circle of control – Definition of URGENT and IMPORTANT – Time Wasters and how to reduce – Procrastination – meaning and impact – 4 Quadrants.

### UNIT V TEAM BUILDING 6

Meaning – Aspects of team building – Process of team building – Types of Teams – Team Ethics and Understanding – Team trust and commitment.

**TOTAL: 30 Hours**

### TEXT/REFERENCE BOOKS:

- T1. B N Ghosh, Managing Soft Skills and Personality, Mc graw Hill Publications
- T2. Shejwalkar and Ghanekar,Principles and Practices of Management,Mc Graw Hill Latest.
- T3. Roberta Roesch ,Time management for Busy people, Tata McGraw–Hill Edition

### REFERENCE BOOKS:

- R1. D. P. Sabharwal, Personality Development Handbook, Fingerprint publishing, 2021
- R2. Dr V M Selvaraj, Personality Development, Bhavani Publications

**WEBLINKS:**

- <https://www.thebalancecareers.com/list-of-soft-skills-2063770>
- <https://www.investopedia.com/terms/s/soft-skills.asp>
- <https://in.indeed.com/career-advice/resumes-cover-letters/soft-skills>

**COURSE OUTCOMES**

At the end of the course, the student will be able to

<b>CO1:</b>	Articulate by understanding the rate and flow of speech.	<b>K3</b>
<b>CO2:</b>	Choose words and phrases appropriately for any verbal communication.	<b>K3</b>
<b>CO3:</b>	Develop a positive attitude in handling diverse situations.	<b>K4</b>
<b>CO4:</b>	Prioritize important and urgent tasks using the four quadrants method.	<b>K4</b>
<b>CO5:</b>	Practice team ethics and understanding when working with teams.	<b>K3</b>

**22EPD104 PERSONALITY DEVELOPMENT IV**

**L T P Credits**  
**2 0 0 2**

**COURSE OBJECTIVES:**

- To enhance the soft skills and prepare them towards the skills needed for their career.

**UNIT I SOFT SKILLS****6**

Assertiveness – Meaning – Importance of assertiveness – Characteristics of Assertive communication – Merits – forms of assertion – Causes of misunderstanding

**UNIT II COMMUNICATION SKILLS****6**

Meaning – Elements of Communication – Functions of Communication – Principles of Communication Formal and Informal Communication – Barriers in Communication – Characteristics of good – communication – Feedback – Communication systems.

**UNIT III PRESENTATION SKILLS****6**

Meaning – Importance of Presentation – Concept of 5 W's and one H – understanding the audience – Types of presentations – How to make effective presentation.

**UNIT IV PRESENTATION SKILLS II****6**

Use of slide, PPT's and visuals – Rules for slide presentation – precautions – seminars and conferences – Steps to eliminate Stage fear.

**UNIT V CHANGE MANAGEMENT****6**

Definition – Necessity – Resistance towards Change – 10 Principles of Change Management – Leaders approach – Effective Change management.

**TOTAL: 30 Hours****TEXT BOOKS:**

- T1. LaClair, J. and Rao, R. Helping Employees Embrace Change, McKinsey Quarterly, 2002, Number 4.
- T2. Spencer Johnson, Who Moved My Cheese, Vermilion, First edition
- T3. Adair, John, Effective Communication, London: Pan Macmillan Ltd., 2003.

**REFERENCE BOOKS:**



R1.Bovee, Courtland L, John V. Thill & Barbara E. Schatzman. Business Communication Today, Tenth Edition. New Jersey: Prentice Hall, 2010.

**WEBLINKS:**

- <https://www.thebalancecareers.com/communication-skills-list-2063779>
- <https://www.mindtools.com/page8.html>

**COURSE OUTCOMES**

At the end of the course, the student will be able to

<b>CO1:</b>	Be assertive in their communication.	<b>K3</b>
<b>CO2:</b>	Differentiate the principles of formal and informal communication.	<b>K4</b>
<b>CO3:</b>	Make an effective presentation by understanding the audience.	<b>K3</b>
<b>CO4:</b>	Practice the rules of presentation using slides, PPT's and visuals.	<b>K3</b>
<b>CO5:</b>	Discuss the principles of change management.	<b>K2</b>

**ANNEXURE II****B.E CIVIL ENGINEERING  
SEMESTER – I**

<b>Category</b>	<b>Code</b>	<b>Course</b>	<b>Interdisciplinary</b>	<b>Activities/Content with direct on Employability / Competency/ Entrepreneurship / Skill development</b>
HSC	22CBCI11	English	<b>Interdisciplinary</b>	<b>Competency Skill development</b>
BSC	22CBCI12	Physics (Mechanics And Mechanics Of Solids)	<b>Interdisciplinary</b>	<b>Competency Skill development</b>
BSC	22CBCI13	Mathematics - I (CALCULUS,MULTIVARIABLE CALCULUS AND LINEAR)	<b>Interdisciplinary</b>	<b>Competency Skill development</b>
ESC	22CBCI14	Basic Electrical And Electronics Engineering	<b>Interdisciplinary</b>	<b>Employability Competency</b>
ESC (Blended)	22CBCI15	Engineering Graphics And Design	<b>Interdisciplinary</b>	<b>Employability Competency</b>
HSC	22PBCI11	Practical - Engineering English	<b>Interdisciplinary</b>	<b>Employability Competency</b>
BSC	22PBCI12	Practical - Engineering Physics	<b>Interdisciplinary</b>	<b>Employability</b>
ESC	22PBCI13	Practical - Basic Electrical And Electronics Engineering	<b>Interdisciplinary</b>	<b>Entrepreneurship Skill development</b>
MC	22CBCI16	Constitution Of India	<b>Interdisciplinary</b>	<b>Skill development</b>

**SEMESTER – II**

<b>Category</b>	<b>Code</b>	<b>Course</b>	<b>Interdisciplinary</b>	<b>Activities/Content with direct on Employability / Competency/ Entrepreneurship / Skill development</b>
BSC	22GCCH21	Chemistry	<b>Interdisciplinary</b>	<b>Competency Skill development</b>
BSC	22GCMA21	Mathematics II	<b>Interdisciplinary</b>	<b>Competency Skill development</b>
ESC	22CBCE22	Programming for Problem Solving	<b>Interdisciplinary</b>	<b>Employability Competency</b>
ESC	22CGE204	Basics of Civil and Mechanical Engineering	<b>Interdisciplinary</b>	<b>Employability Competency</b>
ESC (Blended)	22PBME21	Workshop and Manufacturing Practices	<b>Interdisciplinary</b>	<b>Competency</b>
BSC	22CGE206	Chemistry Laboratory	<b>Interdisciplinary</b>	<b>Employability Competency</b>
ESC	22PBCE21	Programming for Problem Solving Laboratory	<b>Interdisciplinary</b>	<b>Employability Competency</b>
MC	22GCHV21	Universal Human Values - 2	<b>Interdisciplinary</b>	<b>Skill development</b>

### SEMESTER – III

Category	Code	Course	Interdisciplinary	Activities/Content with direct on Employability / Competency/ Entrepreneurship / Skill development
BSC	22GCMA31	Mathematics III	Interdisciplinary	Competency Skill development
ESC	22CBCI32	Energy Science & Engineering	Interdisciplinary	Competency Skill development
PCC	22CBCI33	Introduction to Fluid Mechanics	-	Employability Competency
PCC	22CBCI34	Introduction to Solid Mechanics	Interdisciplinary	Employability Competency
PCC (Blended)	22CBCI35	Engineering Mechanics	Interdisciplinary	Competency Skill development
PCC (Practical)	22PBCI31	Strength of Materials Laboratory	Interdisciplinary	Entrepreneurship
PCC (Practical)	22PBCI32	Hydraulics Laboratory	-	Employability Competency
HSC	22SUPD31	Personality Development I (Effective Technical Communication)	Interdisciplinary	Skill development
MC	22BESY31	Basic Life Skills	Interdisciplinary	Skill development

### SEMESTER – IV

Category	Code	Course	Interdisciplinary	Activities/Content with direct on Employability / Competency/ Entrepreneurship / Skill development
BSC	22CMC041	Biology for Engineers	Interdisciplinary	Competency Skill development
PCC	22CMC042	Surveying & Geomatics	-	Competency Skill development
PCC	22CMC043	Mechanics of Materials	-	Employability Competency
PCC	22CMC044	Disaster Preparedness & Planning	-	Employability Competency
PCC	22CMC045	Transportation Engineering	-	Competency Skill development
PCC (Blended)	22CMV046	Engineering Geology	-	Employability
PCC (Practical)	22CMV047	Computer Aided Civil Engineering Drawing Laboratory	-	Employability Competency
PCC (Practical)	22CMV048	Modern Surveying Laboratory		Employability
HSC	22EPD102	Personality Development II	Interdisciplinary	Employability Skill development
MC	22CMC049	Environmental Science and Engineering	Interdisciplinary	Competency/ Employability/ Skill development
MC	22MCMC41	Gender Institution and Society	Interdisciplinary	Competency

### SEMESTER – V

Category	Code	Course	Interdisciplinary	Activities/Content with direct on Employability / Competency/ Entrepreneurship / Skill development
PCC	22CMC051	Geotechnical Engineering	-	<b>Employability Competency</b>
PCC	22CMC052	Structural Analysis	-	<b>Employability</b>
PEC	22ECV111	Air And Noise Pollution Control	<b>Interdisciplinary</b>	<b>Employability</b>
OEC (Technical)	22ECV152	Total Quality Management	<b>Interdisciplinary</b>	<b>Employability</b>
PCC (Blended)	22CMC053	Construction Engineering and Management	-	<b>Employability Competency</b>
PCC (Practical)	22CMC054	Geotechnical Engineering Laboratory	-	<b>Employability</b>
PCC (Practical)	22CMC055	Environmental Engineering Laboratory	<b>Interdisciplinary</b>	<b>Employability Competency</b>
HSC	22EPD103	Personality Development III	<b>Interdisciplinary</b>	<b>Employability Skill development</b>
PCC		Industrial Training/ Mini Project Survey Camp/ MOOC Courses (NPTEL/SWAYAM/CourseEra/Mahworks) - Minimum 4 weeks	<b>Interdisciplinary</b>	<b>Employability Skill development</b>

### SEMESTER – VI

Category	Code	Course	Interdisciplinary	Activities/Content with direct on Employability / Competency/ Entrepreneurship / Skill development
PCC	22CMC061	Design of Reinforced Concrete Structures	-	<b>Employability Competency</b>
PCC	22CMC062	Concrete Technology	-	<b>Employability Competency</b>
PEC	22ECV107	Foundation Engineering	-	<b>Employability</b>
PEC (Blended)	22ECV110	Environmental Engineering	<b>Interdisciplinary</b>	<b>Employability Competency</b>
OEC (Technical)	22ECV151	Organizational Behaviour	<b>Interdisciplinary</b>	<b>Entrepreneurship</b>
PCC (Practical)	22CMC063	Computer Aided Design and Drawing Laboratory	<b>Interdisciplinary</b>	<b>Employability Skill development</b>
PCC (Practical)	22CMC064	Concrete Technology Laboratory	-	<b>Employability Skill development</b>
HSC	22EPD104	Personality Development - IV	<b>Interdisciplinary</b>	<b>Employability Skill development</b>
PCC	22IBCI61	Summer Internship (4 weeks)	-	<b>Employability Skill development</b>

## SEMESTER VII

Category	Code	Course	Activities/Content with direct on Interdisciplinary	Activities/Content with direct on Employability/ Competency/ Entrepreneurship / Skill development /
PCC	22CMC071	Engineering Economics, Estimation and Costing	<b>Interdisciplinary</b>	<b>Employability</b>
OEC (Technical)	22ECV101	Design of Prestressed Concrete Structures	-	<b>Employability</b>
OEC (Technical/ Management)	22ECV156	E-commerce	<b>Interdisciplinary</b>	<b>Employability /Entrepreneurship</b>
PEC	22ECV154	Global warming and climate change	<b>Interdisciplinary</b>	<b>Employability</b>
PEC (Blended)	22ECV202	Traffic Engineering and Management	<b>Interdisciplinary</b>	<b>Employability</b>
PCC (Practical)	22CMC072	Estimation And Costing Laboratory	-	<b>Employability/ Entrepreneurship</b>
Project	22RBCI71	Project Phase I	<b>Interdisciplinary</b>	<b>Employability/ Entrepreneurship</b>

## SEMESTER VIII

Category	Code	Course	Activities/Content with direct on Interdisciplinary	Activities/Content with direct on Employability/ Competency/ Entrepreneurship / Skill development /
PEC	22ECV103	Earthquake Engineering	-	<b>Employability</b>
OEC	22ECV158	Intellectual Property Rights	<b>Interdisciplinary</b>	<b>Competency/ Employability</b>
OEC	22ECV160	Role of Citizens in Environment Conservation	<b>Interdisciplinary</b>	<b>Competency/ Skill development</b>
Project	22RBCI81	Project Phase II	<b>Interdisciplinary</b>	<b>Skill development</b>

### ANNEXURE III

### B.E CIVIL ENGINEERING

#### LIST OF COURSES INTEGRATE CROSS CUTTING ISSUES

S. N O	Name of the Program	Course Code	Name of the course	Gender	Environment and Sustainability	Human Values	Health Determinants	Right to Health	Emerging Demographic changes	Professional Ethics
1	B.E CIVIL ENGINEERING	22CBCI11	English							✓
2	B.E CIVIL ENGINEERING	22CBCI12	Physics (Mechanics And Mechanics Of Solids)						✓	
3	B.E CIVIL ENGINEERING	22CBCI13	Mathematics - I (CALCULUS,MULTIVARIABLE CALCULUS AND LINEAR)						✓	
4	B.E CIVIL ENGINEERING	22CBCI14	Basic Electrical And Electronics Engineering						✓	
5	B.E CIVIL ENGINEERING	22CBCI15	Engineering Graphics And Design						✓	
6	B.E CIVIL ENGINEERING	22PBCI11	Practical - Engineering English						✓	
7	B.E CIVIL ENGINEERING	22PBCI12	Practical - Engineering Physics						✓	
8	B.E CIVIL ENGINEERING	22PBCI13	Practical - Basic Electrical And Electronics Engineering						✓	
9	B.E CIVIL ENGINEERING	22CBCI16	Constitution Of India			✓				
10	B.E CIVIL ENGINEERING	22GCCH21	Chemistry						✓	
11	B.E CIVIL ENGINEERING	22GCMA21	Mathematics II						✓	
12	B.E CIVIL ENGINEERING	22CBCE22	Programming for Problem Solving						✓	

	ERING									
13	B.E CIVIL ENGINE ERING	22CGE204	Basics of Civil and Mechanical Engineering						✓	
14	B.E CIVIL ENGINE ERING	22PBME21	Workshop and Manufacturing Practices						✓	
15	B.E CIVIL ENGINE ERING	22CGE206	Chemistry Laboratory						✓	
16	B.E CIVIL ENGINE ERING	22PBCE21	Programming for Problem Solving Laboratory							✓
17	B.E CIVIL ENGINE ERING	22GCHV21	Universal Human Values - 2	✓	✓	✓			✓	✓
18	B.E CIVIL ENGINE ERING	22GCMA3 1	Mathematics III						✓	
19	B.E CIVIL ENGINE ERING	22CBCI32	Energy Science & Engineering						✓	
20	B.E CIVIL ENGINE ERING	22CBCI33	Introduction to Fluid Mechanics						✓	
21	B.E CIVIL ENGINE ERING	22CBCI34	Introduction to Solid Mechanics						✓	
22	B.E CIVIL ENGINE ERING	22CBCI35	Engineering Mechanics						✓	
23	B.E CIVIL ENGINE ERING	22PBCI31	Strength of Materials Laboratory						✓	✓
24	B.E CIVIL ENGINE ERING	22PBCI32	Hydraulics Laboratory							✓
25	B.E CIVIL ENGINE ERING	22SUPD31	Personality Development I (Effective Technical Communication)						✓	✓
26	B.E CIVIL ENGINE ERING	22CMC041	Biology for Engineers		✓	✓				
27	B.E CIVIL ENGINE ERING	22CMC042	Surveying & Geomatics						✓	
28	B.E CIVIL ENGINE	22CMC043	Mechanics of Materials						✓	

	ERING									
29	B.E CIVIL ENGINE ERING	22CMC044	Disaster Preparedness & Planning						✓	
30	B.E CIVIL ENGINE ERING	22CMC045	Transportation Engineering						✓	
31	B.E CIVIL ENGINE ERING	22CMV046	Engineering Geology						✓	
32	B.E CIVIL ENGINE ERING	22CMV047	Computer Aided Civil Engineering Drawing Laboratory							✓
33	B.E CIVIL ENGINE ERING	22CMV048	Modern Surveying Laboratory							✓
34	B.E CIVIL ENGINE ERING	22EPD102	Personality Development II			✓				✓
35	B.E CIVIL ENGINE ERING	22CMC049	Environmental Science and Engineering		✓				✓	
36	B.E CIVIL ENGINE ERING	22MCMC4 1	Gender Institution and Society	✓						
37	B.E CIVIL ENGINE ERING	22CMC051	Geotechnical Engineering						✓	
38	B.E CIVIL ENGINE ERING	22CMC052	Structural Analysis						✓	
39	B.E CIVIL ENGINE ERING	22ECV111	Air And Noise Pollution Control		✓				✓	
40	B.E CIVIL ENGINE ERING	22ECV152	Total Quality Management				✓		✓	
41	B.E CIVIL ENGINE ERING	22CMC053	Construction Engineering and Management						✓	
42	B.E CIVIL ENGINE ERING	22CMC054	Geotechnical Engineering Laboratory							✓
43	B.E CIVIL ENGINE ERING	22CMC055	Environmental Engineering Laboratory				✓			✓
44	B.E CIVIL ENGINE	22EPD103	Personality Development III			✓				



	ERING									
45	B.E CIVIL ENGINE ERING	22SUPD51	Industrial Training/ Mini Project/ Survey Camp/ MOOC Course (NPTEL/SWAYAM/ CourseEra/Mathwor ks) - Minimum 4 weeks		✓	✓		✓	✓	✓
46	B.E CIVIL ENGINE ERING	22CMC061	Design of Reinforced Concrete Structures						✓	
47	B.E CIVIL ENGINE ERING	22CMC062	Concrete Technology						✓	
48	B.E CIVIL ENGINE ERING	22ECV107	Foundation Engineering						✓	
49	B.E CIVIL ENGINE ERING	22ECV110	Environmental Engineering		✓				✓	
50	B.E CIVIL ENGINE ERING	22ECV151	Organizational Behaviour			✓				✓
51	B.E CIVIL ENGINE ERING	22CMC063	Computer Aided Design and Drawing Laboratory							✓
52	B.E CIVIL ENGINE ERING	22CMC064	Concrete Technology Laboratory							✓
53	B.E CIVIL ENGINE ERING	22EPD104	Personality Development - IV			✓				✓
54	B.E CIVIL ENGINE ERING	22IBC161	Summer Internship (4 weeks)		✓	✓	✓		✓	✓
55	B.E CIVIL ENGINE ERING	22CMC071	Engineering Economics, Estimation and Costing						✓	
56	B.E CIVIL ENGINE ERING	22ECV101	Design of Prestressed Concrete Structures						✓	
57	B.E CIVIL ENGINE ERING	22ECV156	E-commerce						✓	
58	B.E CIVIL ENGINE ERING	22ECV154	Global warming and climate change		✓				✓	
59	B.E CIVIL ENGINE	22ECV202	Traffic Engineering and Management							

	ERING									
60	B.E CIVIL ENGINE ERING	22CMC072	Estimation And Costing Laboratory							
61	B.E CIVIL ENGINE ERING	22RBCI71	Project Phase I		✓	✓	✓		✓	✓
62	B.E CIVIL ENGINE ERING	22ECV103	Earthquake Engineering						✓	
63	B.E CIVIL ENGINE ERING	22ECV158	Intellectual Property Rights						✓	✓
64	B.E CIVIL ENGINE ERING	22ECV160	Role of Citizens in Environment Conservation							
65	B.E CIVIL ENGINE ERING	22RBCI81	Project Phase II		✓	✓	✓		✓	✓