



**GOKUL  
GLOBAL  
UNIVERSITY**

Approved By Govt. of Gujarat  
(Recognized by UGC under Section 22 & 2(f) of 1956)  
(Gujarat Private State University Act 4 of 2018)

## COURSE STRUCTURE

### Bachelor of Engineering

#### Civil Engineering

Under

Choice Based Credit System (CBCS)



Faculty of Engineering  
**Hansaba College of Engineering & Technology**



University Campus, State Highway-41, Siddhpur - 384151, Dist. Patan, Gujarat, INDIA  
E: dean.fac.engg@gokuluniversity.ac.in W: www.gokuluniversity.ac.in M: +91 95109 73860



## PROGRAM OUTCOMES (PO)

- PO1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6 **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.





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### **PROGRAM SPECIFIC OUTCOMES**

- PSO-1: Applying the Civil Engineering Principles and using suitable software to analyze, design, preparing drawings, reports and estimates for Civil Engineering Structures.
- PSO- 2: Ability to conduct field and laboratory tests, surveys as per the Indian Standards for different Civil Engineering Projects and Materials



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### Semester -I

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	I	FEB110001	Engineering Mathematics-I	5(3+2+0)	Basic Science Courses
2	I	FEB110202	Elements of Mechanical Engineering	5(4+0+2)	Engineering Science courses
3	I	FEB110003	Communication Skill	4(3+1+0)	Humanities & Social science including management courses
4	I	FEB110304	Elements of Electrical Engineering	5(4+0+2)	Engineering Science courses
5	I	FEB110006	Physics	4(3+0+2)	Basic Science Courses
6	I	FEB110206	Basic Workshop	2(0+0+4)	Engineering Science courses
		FEB110007	Induction Program	0	Mandatory Course
<b>TOTAL</b>				<b>25</b>	





**Semester -II**

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	II	FEB120001	Engineering Mathematics - II	5(4+1+0)	Basic Science Courses
2	II	FEB120102	Elements of Civil Engineering	5(4+0+2)	Engineering Science courses
3	II	FEB120403	Computer Programming With C	5(4+0+2)	Engineering Science courses
4	II	FEB120204	Engineering Graphics	5(3+0+4)	Engineering Science courses
5	II	FEB120105	Environmental Science	0(2+2+0)	Mandatory Course
<b>TOTAL</b>				<b>20</b>	





**Semester -III**

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	III	FEB130001	Effective Technical Communication	3 (2+0+2)	Humanities & Social science including management courses
2	III	FEB130002	Indian Constitution	0(2+0+0)	Mandatory Courses
3	III	FEB130101	Engineering Mathematics – III (Transform & Discrete Mathematics)	3 (2+0+2)	Basic Science Courses
4	III	FEB130102	Building Construction Technology	5(4+0+2)	Professional Core Courses
5	III	FEB130103	Engineering Geology	3 (2+0+2)	Professional Core Courses
6	III	FEB130104	Mechanics of Solids	5(4+0+2)	Professional Core Courses
<b>TOTAL</b>				<b>19</b>	





**Semester -IV**

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	IV	FEB140001	Essence of Indian Traditional Knowledge	0 (2+0+0)	Mandatory Courses
2	IV	FEB140101	Building and Town Planning	4 (2+0+4)	Professional Core Courses
3	IV	FEB140102	Civil Engineering Social & Global Impact	2 (2+0+0)	Humanities & Social science including management courses
4	IV	FEB140103	Fluid Mechanics	3 (2+0+2)	Professional Core Courses
5	IV	FEB140104	Materials, Testing & Evaluation	3 (2+0+2)	Professional Core Courses
6	IV	FEB140105	Structural Analysis I	3 (2+0+2)	Professional Core Courses
7	IV	FEB140106	Surveying	3 (2+0+2)	Professional Core Courses
<b>TOTAL</b>				<b>18</b>	







**Semester -V**

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	V	FEB150001	Engineering Economics & Management	3 (3+0+0)	Humanities & Social science including management courses
2	V	FEB150101	Hydrology and Water Resources Engineering	4 (3+1+0)	Professional Core Courses
3	V	FEB150102	Soil Engineering-I	4 (3+0+2)	Professional Core Courses
4	V	FEB150103	Structural Analysis II	4 (3+0+2)	Professional Core Courses
5	V	FEB150104	Transportation Engineering-I	4 (3+0+2)	Professional Core Courses
6	V		Department Elective-I	3 (2+0+2)	Professional Elective Courses
<b>Total</b>				<b>22</b>	
Department Elective-I					
Sr no.	SUBJECT CODE	SUBJECT NAME		TEACHING SCHEME	
1	FEB150105	Air Pollution Control		3 (2+0+2)	
2	FEB150106	Infrastructure Planning		3 (2+0+2)	







**Semester - VI**

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	VI		Open Elective-I		Open Elective Courses
2	VI	FEB160101	Environmental Engineering	4 (3+0+2)	Professional Core Courses
3	VI	FEB160102	Hydraulic Engineering	4 (3+0+2)	Professional Core Courses
4	VI	FEB160103	Soil Engineering-II	4 (3+0+2)	Professional Core Courses
5	VI	FEB160104	Transportation Engineering-II	3 (2+0+2)	Professional Core Courses
6	VI		Department Elective-II	4 (3+0+2)	Professional Elective Courses
<b>Total</b>				<b>22</b>	
Open Elective - I					
Sr no.	SUBJECT CODE	SUBJECT NAME		TEACHING SCHEME	
1	FEB160001	Cyber Security		3 (0+2+2)	
2	FEB160002	Remote Sensing and GIS		3 (3+0+0)	
Department Elective-II					
Sr no.	SUBJECT CODE	SUBJECT NAME		TEACHING SCHEME	
1	FEB160105	Concrete Technology & Repair Strategy		4 (3+0+2)	
2	FEB160106	Disaster Assessment using Geospatial Techniques		4 (3+0+2)	





**Semester -VII**

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	VII		OPEN ELECTIVE-II	3 (3+0+0)	Open Elective Courses
2	VII	FEB170101	Professional Practice and Valuation	4 (3+0+2)	Professional Core Courses
3	VII	FEB170102	Structural Design -I	5 (4+0+2)	Professional Core Courses
4	VII		Department Elective-III	3 (2+0+2)	Professional Elective Courses
6	VII	FEB170105	Project-I	4 (0+0+8)	Project
Total				19	
Open Elective-II					
Sr no.	SUBJECT CODE	SUBJECT NAME		TEACHING SCHEME	
1	FEB170001	Integrated Personality Development		3 (3+0+0)	
3	FEB170002	Metro Systems and Engineering		3 (3+0+0)	
Department Elective-III					
Sr no.	SUBJECT CODE	SUBJECT NAME		TEACHING SCHEME	
1	FEB170103	Earthquake Engineering		3 (2+0+2)	
2	FEB170104	Urban Transportation Planning		3 (2+0+2)	





**Semester -VIII**

SR	SEMESTER	SUBJECT CODE	SUBJECT NAME	CREDIT	CATEGORY
1	VIII	FEB180101	Construction Management & Equipment	4 (3+0+2)	Professional Core Courses
2	VIII	FEB180102	Structural Design -II	5(4+0+2)	Professional Core Courses
3	VIII		Department Elective- IV	3 (2+0+2)	Professional Elective Courses
4	VIII	FEB180105	PROJECT -II	8 (0+0+16)	Project
Total				20	
Department Elective-IV					
Sr no.	SUBJECT CODE	SUBJECT NAME		TEACHING SCHEME	
1	FEB180103	Dock Harbour and Airport Engineering		3 (2+0+2)	
2	FEB180104	Irrigation Engineering		3 (2+0+2)	





## Gokul Global University, Sidhpur.



### Faculty of Engineering

**Program :** Bachelor of Engineering

**Subject / Branch :** ALL

**Year :** 1<sup>st</sup>

**Semester :** I

**Course title :** Engineering mathematics-I

**Course code :** FEB110001

**Course type :** Basic Science Courses

**Course credit :** 05

**Pre-requisite :** Algebra, Trigonometry, Geometry

**Rationale :** The study of rate of changes, understanding to compute area, volume and express the function in terms of series, to apply matrix algebra.

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	2	0	5	5	70	30	30	20	150

#### Course Objective :

1. To recall and remember basics of matrices, integration, sequence and series and differential calculus.
2. To understand the concepts of basic mathematical methods for matrices, integration, sequence and series and differential calculus.
3. To apply methods to solve engineering problems.
4. To analyze engineering problems and evaluate.
5. To solve and evaluate the problems using matrices, integration, sequence and series and differential calculus.



### Course Outcome :

After learning the course the students should be able to

- (I) To apply differential and integral calculus to improper integrals and to determine applications of definite integral. Apart from some other applications they will have a basic understanding of indeterminate forms, Beta and Gamma functions.
- (II) To apply the various tests of convergence to sequence, series and the tool of power series and fourier series for learning advanced Engineering Mathematics.
- (III) To compute directional derivative, maximum or minimum rate of change and optimum value of functions of several variables.
- (IV) Mathematics has the potential to understand the core Technological studies
- (V) To compute the areas and volumes using multiple integral techniques.
- (VI) To perform matrix computation in a comprehensive manner.

### Content

Unit	Description in detail	Teaching Hours	Weightage
I	Indeterminate Forms and L'Hôpital's Rule.  Improper Integrals, Convergence and divergence of the integrals, Beta and Gamma functions and their properties.  Elementary row operations in Matrix, Row echelon and Reduced row echelon forms, Rank by echelon forms, Inverse by Gauss-Jordan method, Solution of system of linear equations by Gauss elimination and GaussJordan methods. Eigen values and eigen vectors, Cayley-Hamilton theorem, Diagonalization of a matrix.	12	25 %
II	Convergence and divergence of sequences, The Sandwich Theorem for Sequences, The Continuous Function Theorem for Sequences, Bounded Monotonic Sequences, Convergence and divergence of an infinite series, geometric series, telescoping series, Combining series, Harmonic Series, Integral test, The p - series, The Comparison test, The Limit Comparison test, Ratio test, Raabe's Test, Root test, Alternating series test, Absolute and Conditional convergence, Power series, Radius of convergence of a power series, Taylor and Maclaurin series.  Fourier Series of $2n$ periodic functions, Dirichlet's conditions for	14	30 %





	representation by a Fourier series, Orthogonality of the trigonometric system, Fourier Series of a function of period $2n$ , Fourier Series of even and odd functions, Half range expansions.		
III	Limit and continuity of function of several variables, partial derivatives, directional derivatives, total derivatives, Chain rule, derivatives of implicit functions, Euler's theorem on homogeneous functions, Taylor's and Maclaurin's expansion for function of two variables, Extrema of function of several variables, Application of Lagrange method of undetermined multipliers, Tangent plane and normal line	10	20 %
IV	Multiple Integration: Double integrals, change of order of integration, Change of variables, Applications: areas and volumes Triple integrals, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallele pipeds; Jacobian, Multiple integral by substitution.  Applications of definite integrals to evaluate surface areas and volumes of revolutions.	12	25 %

### Reference Books :

1. Maurice D. Weir, Joel Hass, Thomas' Calculus, Early Transcendentals, 13e, Pearson, 2014.
2. Howard Anton, Irl Bivens, Stephens Davis, Calculus, 10e, Wiley, 2016.
3. James Stewart, Calculus: Early Transcendentals with Course Mate, 7e, Cengage, 2012.
4. Elementary Linear Algebra, Applications version, Anton and Rorres, Wiley India Edition.
5. T. M. Apostol, Calculus, Volumes 1 & 2, Wiley Eastern

### Suggested Readings :

1. Swaym video lecture.
2. Mathematics magazine

### Online Resources :

1. <http://nptel.ac.in>
2. <https://ocw.mit.edu/courses>
3. <https://www.edx.org>

### Practical / Activities :

1. Problems solving.
2. Tutorial solving.







3. Seminar by students.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	1	1	1	-	-	-	-	1	1	-	-	-	-
CO-2	1	1	2	-	2	-	-	-	-	-	-	-	-	-
CO-3	1	-	-	2	-	-	-	-	1	-	-	1	-	-
CO-4	-	2	-	-	1	-	-	-	-	1	-	-	-	-
CO-5	1	-	1	-	-	-	-	-	-	-	-	-	-	-
CO-6	2	-	-	1	-	-	-	-	2	1	-	1	-	-







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**Faculty of Engineering**

**Program :** Bachelor of Engineering

**Subject / Branch :** ALL

**Year :** 1<sup>st</sup>

**Semester :** I

**Course title :** Elements Of Mechanical  
Engineering

**Course code :** FEB110202

**Course type :** Engineering Science courses

**Course credit :** 05

**Pre-requisite :** NIL

**Rationale :** NIL

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
4	0	2	6	5	70	30	30	20	150

Sr No.	Subject Content	Teaching Hours	Weightage (%)
1	<b>Introduction:</b> Prime movers and its types, Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth Law and First law.	4	25%
2	<b>Energy:</b> Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels,	3	



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	Environmental issues like Global warming and Ozone depletion		
3	<b>Properties of gases:</b> Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between $C_p$ and $C_v$ , Various non flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly-tropic process	5	
4	<b>Properties of Steam:</b> Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables, steam calorimeters	6	30%
5	<b>Heat Engines:</b> Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine; Otto cycle and Diesel cycles	5	
6	<b>Steam Boilers:</b> Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, Functioning of different mountings and accessories	-	
7	<b>Internal Combustion Engines:</b> Introduction, Classification, Engine details, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies	4	20%
8	<b>Pumps:</b> Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming	3	
9	<b>Air Compressors:</b> Types and operation of Reciprocating and Rotary air compressors, significance of Multistage	3	
10	<b>Refrigeration &amp; Air Conditioning:</b> Refrigerant, Vapor compression refrigeration system, vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners	4	25%
11	<b>Couplings, Clutches and Brakes:</b> Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc)	3	
12	<b>Transmission of Motion and Power:</b> Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive	4	

**List of suggested Practical:-**

1. To understand construction and working of various types of boilers.
2. To understand construction and working of different boiler mountings and accessories.
3. To determine brake thermal efficiency of an I. C. Engine.
4. To understand construction and working of different types of air compressors.
5. To demonstrate vapour compression refrigeration cycle of domestic refrigerator OR window air





conditioner OR split air conditioner.

**References Books:-**

1. Elements of Mechanical Engineering by N M Bhatt and J R Mehta, Mahajan Publishing House
2. Basic Mechanical Engineering by Pravin Kumar, Pearson
3. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi
4. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication
5. Introduction to Engineering Materials by B.K. Agrawal Tata Mcgraw Hill Publication, New Delhi

**Course Outcomes:-**

After learning the course the students should be able to

- CO1** To understand the fundamentals of mechanical systems
- CO2** To understand and appreciate significance of mechanical engineering in different fields of engineering
- CO3** Enhancement of fundamental knowledge of Thermodynamics
- CO4** Enhancement of fundamental knowledge of Fluid Mechanics and I.C. Engines
- CO5** Acquiring knowledge of materials and their properties for engineering applications
- CO6** Evaluate properties of steam. Demonstrate various types of boilers and their relative merits and demerits. Learning problem solving in particular domain.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)														
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	2	2	-	-	-	2	-	-	-	-	-	-	-	-	-
CO-3	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-
CO-4	1	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO-5	1	-	-	-	1	1	1	-	-	-	-	-	-	-	-
CO-6		2	-	-	-	-	-	-	-	-	-	-	-	-	-





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**Faculty of Engineering**

**Program :** Bachelor of Engineering

**Subject / Branch :** ALL

**Year :** 1<sup>st</sup>

**Semester:** I

**Course title :** Communication skill

**Course code :** FEB110003

**Course type :** Language and Communication

**Course credit :** 04

**Pre-requisite :** Zeal to learn the subject

**Rationale :** The rationale of the curriculum is to help students refresh their knowledge of English language. It also targets the understanding of grammar, focusing on comprehension, and reading, speaking and writing skills. This would be developed through balanced and integrated tasks.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	4	70	30	30	20	150

**Course Objective :**

6. To enable understand
7. To speak
8. To Read and write



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### Course Outcome :

CO1: Understand the basics of communication and its significance to the career as an engineer.

CO2 : Comprehend and express any idea/thought in an effective manner using the four basic communication skills: Listening, Reading, Speaking, Writing (LSRW).

CO3 : Make effective presentation, face job interview and participate in group communication fruitfully.

CO4 : Handle various professional communication situations more impressively and effectively.

CO5 : The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

### Content

Unit	Description in detail	Teaching Hours	Weightage
I	<b>Introduction:</b> Communication skills Process, types and levels of communication. Technical Communication and General Communication. Factors to be considered in technical communication Verbal and non-verbal communication (kinesics) Components of Non-verbal Communication (Kinesics) Barriers to effective communication. (Noise in oral and written communication) Communication across cultures.	11	25 %
II	<b>Presentation strategies for Communication:</b> Effective presentation strategies. Defining purpose, analysis of audience and locate, organizing contents. Preparing an outline of the presentation. Visual aids, nuances of delivery, Body language and effective presentation. Interviews Introduction, General preparations for an interview, Types of questions generally asked at the interviews. Types of interviews, Importance of nonverbal aspects.	11	25 %
III	<b>Public Speaking Skill:</b> Group Discussions Introduction, Group discussions as a part of the selection process, guidelines for group discussion. Role functions in group discussion. Letter - Writing Business Letters, Structure and types of a business letter, Letter of Inquiry, Letters of complaint, regret and adjustment. Technical reports Introduction, types of reports, structure of reports, objectives and characteristics of reports.	11	25 %







IV	<b>Tools of Communication Skill:</b> Technical Proposals Definition, Purpose, Types, Characteristics, Structure, Style and appearance. Effective Reading Skills Purpose of reading, skimming and scanning. Tips for improving comprehension skills. Job application Essential parts - Cover Letter and the 'resume'. Types of 'resumes' (Curriculum Vitae) Chronological 'resume', functional 'resume'.	11	25 %
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### Reference Books :

1. Practical English Usage, Michael Swan, OUP. 1995
2. Remedial English Grammar, F.T. Wood, Macmillan. 2007
3. Oxford Language Reference, (Indian Edition) OUP
4. On Writing Well, William Zinsser, Harper Resource Book. 2001
5. Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University Press. 2011
6. The Study of Language, George Yule, CUP, 4th Edition. 2010
7. A Course in English Phonetics, T R Kansakar, Orient Longman. 1998
8. Spoken English, R K Bansal and J B Harrison, Orient Longman. 2013

### Suggested Readings :

1. Repedex
2. Conversations books
3. Oral communication skill - calameo
4. Effective communication development

### Online Resources :

1. <https://youtu.be/MUGmEKrZXIY>
2. <https://youtu.be/srn5jgr9TZo>
3. <https://youtu.be/hE6I9apUvrk>

### Practical / Activities :

1. At the Airport
2. At the Railway station
3. Admission inquiry
4. At College
5. At Hotel
6. In Bank
7. In Grocery Shop





8. In Library
9. In Mall

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	1	1	1	-	1	-	-	2	2	1	-	-	-
CO-2	1	1	-	-	-	1	1	1	1	1	-	1	-	-
CO-3	1	1	-	-	-	2	-	1	-	2	-	2	-	-
CO-4	-	-	-	1	-	-	1	2	1	-	1	1	-	-
CO-5	1	2	-	1	-	2	1	-	-	1	-	1	-	-







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**Faculty of Engineering**

<b>Program:</b>	Bachelor of Engineering	<b>Branch:</b>	Electrical Engineering
<b>Year:</b>	1 <sup>st</sup> Year	<b>Semester:</b>	II
<b>Course title:</b>	Element of Electrical Engineering	<b>Course code</b>	FEB110304
<b>Course type:</b>	Engineering Science	<b>Course credit:</b>	05

**Course Objective:** Students are expected to learn the fundamentals of electrical engineering that will help them apply these concepts in everyday life. The course is divided into two parts: DC Circuit and AC Circuit. The course also discusses three-phase supplies that are used in many commercial, industrial, and agricultural applications. Considering the widespread use of batteries, a special unit of batteries has been introduced.

**Teaching & Evaluation Scheme: -**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
4	0	2	6	5	70	30	30	20	150



Faculty of Engineering  
**Hansaba College of Engineering & Technology**



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## Details Syllabus

Unit	Description in detail	Teaching Hours	Weightage
I	<p><b>Introduction Of D.C. Circuits:</b> Introduction, Ohm's Law, Application of Kirchoff's Law, Nodal Analysis, Mesh Analysis, Series-Parallel of Resistance, Ideal and Practical Energy Sources, Line Regulation and Load Regulation, Source Transformation, Star-Delta Transformation, Temperature Co-efficient</p> <p><b>Batteries and Fuel Cell:</b> Introduction of Batteries; The Simple cell, E.M.F and internal resistance of a cell; Primary and Secondary cells, Cell capacity; Types &amp; Specifications of Batteries; Charging &amp; Discharging of Battery; Safe disposal of Batteries; Fuel cell: Principle &amp; Types of fuel cell.</p>	10	18 %
II	<p><b>Electrostatic &amp; Capacitor:</b> Electric charge and Laws of electrostatics; Definitions - Electric field, lines of force, electric field intensity, electric flux and flux density; Electrostatic induction; Gauss's law and its application; Dielectric strength; Capacitor; Capacitor in series and parallel, Energy stored in a capacitor.</p> <p><b>Electro Magnetics:</b> Faradays Laws; Lenz's Law; Fleming's Rules; Effect of magnetic field on current carrying conductor; Magnetic circuits; Statically and dynamically induced EMF; Concepts of self-inductance, mutual inductance and coefficient of coupling; Inductance in series and parallel; Hysteresis and Eddy current losses; Energy stored in magnetic fields</p>	14	25 %
III	<p><b>Single Phase A.C. Circuits:</b> Generation of sinusoidal voltage, Definition of average value, root mean square value, form factor and peak factor; Phasor representation of alternating quantities; Analysis with phasor diagrams of R, L, C, R-L, R-C and R-L-C circuits; Concepts of Real power, Reactive power, Apparent power and Power factor, Series, Parallel and Series - Parallel circuits; Power in AC circuit, Power factor improvement; Resonance in series and parallel circuits, Q-factor, Bandwidth and Selectivity.</p> <p><b>Three Phase A.C. Circuits:</b> Necessity and Advantages of three phase systems, Generation of three phase power, Phase sequence, Balanced supply and Balanced load; Relationship between line and phase values of balanced three phase circuit; Power Measurement in balanced three phase circuits. Measure 3-Phase power by watt-meter methods.</p>	15	50 %
IV	<p><b>Electrical Wiring &amp; Illumination:</b> Types of wires and cables; Types of Connectors &amp; Switches; System of wiring, domestic and industrial wiring; Simple control circuit in domestic installation. Types of lamps, fixtures &amp; reflectors; Illumination schemes for domestic, industrial &amp; commercial premises; Lumen requirements for different categories</p> <p><b>Safety &amp; protection:</b></p>	04	07 %





Safety precautions in handling electrical appliances; Electric shock, First aid for electric shock other hazards of electrical laboratories & safety rules; Grounding & Earthing - Importance of grounding and earthing, equipment for grounding, Methods of earthing; Circuit protection devices: Fuses, MCB, ELCB & Relays.		
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### Reference Books:

1. B.L. Theraja (2012), Electrical Technology, Vol – 1, S. Chand.
2. D.P. Kothari and I.J. Magrath (2013), Theory and Problems in Basic Electrical Engineering, Prentice Hall, India.
3. Parker Smith (2003), Problems in Electrical Engineering, CBS Publishers

### List of Practical / Activities:

1. To perform Ohms Law
2. To perform Kirchhoff's Law.
3. To study about different types of Fuel Cell and Battery
4. To perform R-L Series circuit
5. To study Resonance in AC-RLC series Circuit
6. To study about Star-Delta connection.
7. To study about power measurement using Two Watt-Meter Method.
8. To Study about MCB, ELCB and Fuse.
9. To study about different types of cable.
10. To study about different types of Fuel Cell and Battery.

### Online Resources:

1. Preparation of videos for showing real life applications, Preparation of animations for understanding the concepts,
2. Preparation of Pictures with annotations to explain the concepts.

### Course Outcome:

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

**CO-1:** Understand electrical current, potential difference, power and energy, sources of electrical energy, resistance and its behavior with temperature.

**CO-2:** Use the Ohm's Law and the Kirchhoff's Law and star delta transformation for solving resistive series, parallel and series-parallel circuits.

**CO-3:** Define Electric field, lines of force, electric field intensity, electric flux, flux density and permittivity. Capacitor, charging and discharging phenomena of capacitors and calculations of capacitance for capacitors connected in series and parallel circuits.





**CO-4:** Understand Concepts of Real power, Reactive power, apparent power and Power factor and perform calculations of these quantities for series and parallel R-L-C circuits.

**CO-5:** Understand the importance of safety and the precaution to be taken while working with electrical equipment and accessories. Understand the working principle, usage and construction of circuit protection devices such as fuse, MCB, ELCB & Relays

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	-	2	3	-	-	-	1	-	-	1	-	3	1
CO-2	2	-	-	-	-	-	-	-	1	-	-	-	-	2
CO-3	1	1	-	-	1	-	-	-	-	-	-	-	2	1
CO-4	-	-	2	-	-	-	-	-	-	-	1	-	-	-
CO-5	2	-	-	-	-	1	-	-	-	-	-	-	1	1





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program** : Bachelor of Engineering

**Subject / Branch** : Mechanical , Civil

**Year** : 1<sup>st</sup>

**Semester** : I

**Course title** : Engineering physics-I

**Course code** : FEB110006

**Course type** : Basic Science Courses

**Course credit** : 04

**Pre-requisite** : General lows of physics

**Rationale** : The study of Material and understand its property , and understand the phenomenon of physics . understand the waves. calculate the basic measurement.

**Teaching Examination Scheme** :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	2	5	4	70	30	30	20	150

Th: -Theory, Tu: - Tutorial, P: - Practical, SEE: - Semester End Examinations, PA: - Progressive Assessment.

**Course Objective** :

- To recall and remember basics of physics
- To understand the concepts of semiconductor material and its property. Also study the superconductivity of material. And understand the waves.
- To apply theory on practical basis.



Faculty of Engineering  
**Hansaba College of Engineering & Technology**





- (d) To analyze the lows and too see how they use it.  
(e) To solve the problems and make easy to our life

### Course Outcomes :-

- CO-1: Able to understand, necessary parameters of different materials in different domains.  
CO-2: Demonstrate the behavior of material in different fields based on their properties.  
CO-3: Enhance practical capability and skills for modules using different materials and selection of material for system designs.  
CO-4: The student will demonstrate understanding of basic theory, properties and applications of Superconductivity  
CO-5: The student will demonstrate understanding the basic principles, properties and applications of associated with Waves, Motion and Acoustics.  
CO-6: The student will demonstrate understanding of basic principles, properties, type and application Lasers.

## Content

Unit	Description in detail	Teaching Hours	Weightage
I	<b>Properties of Matter:</b> Concept of Load, Stress and Strain , Hook's Law, Stress-Strain Diagram , Ductility, Brittleness and Plasticity , Elastic behavior of solids, Working stress and factor of safety, Factors affecting elasticity, Types of Elasticity, Twisting couple on a cylinder or wire-shaft, Torsional Pendulum , Cantilever-Depression of Cantilever, Young's modulus by Cantilever, I-shape Griders, Viscosity and comparison of viscosities	8	19 %



II	<b>Waves, Motion and Acoustics:</b>  Simple Harmonic motion, Free, forced, resonance, damped and undamped vibration, Damped harmonic motion, Force vibration and amplitude resonance, Velocity resonance and energy intake, Wave motion, transverse and longitudinal vibration, Sound absorption and reverberation, Sabine's formula and usage (excluding derivation), Acoustic of building	7	19%
III	<b>Ultrasonic and Non destructive testing (NDT):</b>  Ultrasonic waves, Properties of ultrasound, Production of ultrasonic waves : Piezoelectric and magnetostriction method, Detection of ultrasound, Application of ultrasound, Introduction of NDT, Advantages of NDT, NDT through ultrasound	9	25 %
IV	<b>Superconductivity:</b>  Introduction of Superconductivity, Properties of superconductor, Effect of magnetic field, Meissner effect, Pressure effect, Impurity effect, Isotopic mass effect, Mechanism of Superconductivity : BCS Theory, Penetration depth : Magnetic field, Josephson's junction and its application, Application of superconductors	7	17 %
V	<b>Lasers :</b>  Properties of Laser, Einstein's theory of matter radiation : A and B coefficients, Amplification of light by population inversion, Different types of lasers , gas lasers (He-Ne) solid- state lasers(ruby), Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, Applications of lasers in science, engineering and medicine.	7	20 %





### Reference Books :

1. Engineering Physics by Dattu R Joshi, McGraw hill Publications
2. Engineering Physics by Shatendra Sharma & Jyotsan Sharma, Pearson Publication
3. Mechanics of Materials, SI Edition, 9th Edition, Barry J. Goodno, James M. Gere, Published: © 2018 Print ISBN: 9781337093354

### Suggested Readings :

1. SWYAM video lecture.
2. NPTEL videos lecture.

### Online Resources :

1. The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
2. Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
3. [http://www.howstuffworks.com/--Tech stuff](http://www.howstuffworks.com/--Tech+stuff)
4. How things works by Louis A Bloom field ,Wiley Publications
5. Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education

### List of Experiments:

1. Diffraction and interference experiments (from ordinary or laser pointers); measurement of speed of light modulation; minimum deviation from a prism.
2. Measurement of the Distance using Ultrasonic Sensors. light on a table
3. Study of Object Detection using Ultrasonic Sensors.
4. Melde's Experiment Transverse and Longitudinal Modes
5. To determine the frequency of given laser source.
6. Frequency of AC Supply-Sonometer method
7. Wavelength of Light -Diffraction Grating Using LASER



8. Acoustic grating method set up for measurement of velocity of ultrasonic waves in liquid.
9. Melde's experiment
- 10 Resonator
11. Study of Damped Simple Harmonic Motion
12. Newton's rings, Determination of using sodium light.
13. Calibration of Spectrometer & determination of unknown wavelength
14. Dispersive curve of a prism
15. Study of Fabry-Perot Etalon
16. Study of Lloyd's Mirror
17. Study of Double Refraction in Calcite Prism
18. Virtual Heat & Thermodynamics Lab
19. Virtual Advanced Mechanics Lab
20. Virtual Laser Optics Lab
21. Virtual Harmonic Motion & Waves Lab
22. Virtual Optics Lab
23. Virtual Modern Physics Lab
24. Virtual Lab on oscillations
25. Virtual Physical Sciences Lab

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	1	1	1	-	-	-	-	-	-	1	-	-	-
CO-2	1	1	2	1	-	1	-	-	-	-	1	-	1	1
CO-3	-	1	1	1	1	-	1	-	1	1	-	1	-	-
CO-4	2	-	1	-	-	2	-	-	-	-	1	-	-	-
CO-5	1	2	-	2	1	1	-	-	-	1	-	-	1	-
CO-6	2	-	1	1	1	1	-	-	-	1	-	1	-	-





**Gokul Global University, Sidhpur.**



**Faculty of Engineering**

**Program :** Bachelor of Engineering

**Subject / Branch :** Mechanical , Civil

**Year :** 1<sup>st</sup>

**Semester :** I

**Course title :** Engineering physics-I

**Course code :** FEB110206

**Course type :** Engineering Science courses

**Course credit :** 02

**Objective:** Understanding of basic principles of Mechanical Engineering is required in various field of engineering.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
0	0	4	4	2	00	00	80	20	100

Sr.	Content	Total Hrs	% Weightage
1	<b>Introduction:</b> Workshop layout, Importance of various sections/shops of workshop, Types of jobs done in each shop, General safety rules and work procedure in workshop	6	15%
2	<b>Fitting:</b> Select appropriate fitting tools for the Required application, Prepare the simple jobs as per specification using fitting tools, Safety precautions	8	20
3	<b>Tin Smithy:</b> Demonstration of various tin smithy tools and sheet metal operations such as shearing, bending and	6	15





	joining, Preparation of tin smithy job, Safety precautions		
4	<b>Carpentry:</b> Types, sketch, specification, material, applications and methods of using of carpentry tools-saws, planner, chisels, hammers, pallet, marking gauge, vice, try square, rule, etc, Types of woods and their applications, Types of carpentry hardwires and their uses, Demonstration of carpentry operations such as marking, sawing, planning, chiseling, grooving, boring, joining, etc, Preparation of wooden joints, Safety precautions.	8	20%
5	<b>Pipefitting:</b> Types, specification, material and applications of pipe fittings, Types, specifications, material, applications and demonstration of pipe fitting tools, Demonstration of pipe fitting operations such as marking, cutting, bending, threading, assembling, dismantling, etc, Preparation of pipe fitting jobs	6	15
6	<b>Metal joining:</b> 1Select appropriate equipment and consumables for required application, Prepare the simple jobs as per specification using proper metal joining and cutting method, Safety precautions	6	15

### References Books:

1. Work shop technology by Hajra Chaudhary
2. Work shop technology by Chapmen

### Course Outcome:

After learning the course, the students should be able to

**CO1** To acquire skills in basic engineering practice

**CO2** To acquire practical skills in the trades

**CO3** Understand modern manufacturing operations, including their capabilities, limitations, and how to design economically.

**CO4** Welding and soldering operations

**CO5** Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping





Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)												PSO-1	PSO-2
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12		
CO-1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	2	-	-	-	-	-	2	-	-	2	-	-	-
CO-3	-	-	1	-	-	1	-	-	-	-	-	-	-	-
CO-4	2	1	-	2	-	-	-	-	-	2	-	-	-	-
CO-5	-	-	-	-	2	-	-	-	1	-	-	-	-	-

### List of Suggested Practical:

1. Prepare carpentry and fitting shop layout.
2. Prepare simple fitting job as per given drawing.
3. Prepare tin smithy job as per drawing having shearing, bending, joining and riveting.
4. Prepare pipe fitting jobs as per given drawings.
5. Prepare jobs using arc welding, gas cutting, spot welding, brazing and soldering process.





## Gokul Global University, Sidhpur.



### Faculty of Engineering

**Program :** Bachelor of Engineering

**Subject / Branch :** ALL

**Year :** 1<sup>st</sup>

**Semester :** II

**Course title :** Engineering mathematics-II

**Course code :** FEB120001

**Course type :** Basic Science Courses

**Course credit :** 05

**Pre-requisite :** Calculus, fourier series

**Rationale :** To compute line integrals, solution techniques of higher order ordinary differential equations, fourier integral representation.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	2	0	5	5	70	30	30	20	150

**Course Objective :**

- To develop logical understanding of the subject.
- To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from engineering fields.
- To make aware students about the importance and symbiosis between Mathematics and Engineering.

**Course Outcome :**

After learning the course the students should be able to

- To apply mathematical tools needed in evaluating vector calculus and their usage like Work, Circulation and Flux.





(II) To apply the laplace transform as tools which are used to solve differential equations and fourier integral representation.

(III) To apply effective mathematical tools for the solutions of first order ordinary differential equations.

(IV) To apply effective mathematical methods for the solutions of higher order ordinary differential equations.

(v) To implement the solution for engineering problem

(VI) To use series solution methods and special functions like Bessels' functions.

### Content

Unit	Description in detail	Teaching Hours	Weightage
I	Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method. Fourier Integral transform, Fourier Cosine Integral and Fourier Sine Integral	14	30 %
II	First order ordinary differential equations, Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.	10	20 %
III	Ordinary differential equations of higher orders, Second order linear homogeneous differential equations with variable coefficients, Cauchy-Euler equation, Existence and Uniqueness of solution, Linear Dependence and Independence of solution, Wronskian, Non homogeneous Ordinary differential equations, method of undetermined coefficient, method of variation of parameters	12	25 %
IV	Series solution of Ordinary differential equations, Power series solutions; Legendre's equation, Legendre polynomials, Frobenius method, Bessel functions of the first kind and their properties  Vector Fields, Vector derivatives, Arc length, Curvature and Torsion, Gradient of Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.	12	25 %



### Reference Books :

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley and Sons.
2. Peter O'Neill, Advanced Engineering Mathematics, 7th Edition, Cengage.
3. Dennis G. Zill, 4th edition, Advanced Engineering Mathematics, 4th Edition, Jones and Bartlett Publishers.
4. Maurice D. Weir, Joel Hass, Thomas' Calculus, Early Transcendentals, 13e, Pearson, 2014.

### Suggested Readings :

1. Swaym video lecture.
2. Mathematics magazine

### Online Resources :

1. <http://nptel.ac.in>
2. <https://ocw.mit.edu/courses>
3. <https://www.edx.org>

### Practical / Activities :

1. Problems solving.
2. Tutorial solving.
3. Seminar by students.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	1	1	1	-	-	-	-	1	1	-	-	-	-
CO-2	1	1	2	-	2	-	-	-	-	-	-	-	-	-
CO-3	1	-	-	2	-	-	-	-	1	-	-	1	-	-
CO-4	-	2	-	-	1	-	-	-	-	1	-	-	-	-
CO-5	1	-	1	-	-	-	-	-	-	-	-	-	-	-
CO-6	2	-	-	1	-	-	-	-	2	1	-	1	-	-





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 1<sup>st</sup>

**Semester** : II

**Course title** : Element of Civil Engineering

**Course code** : FEB120102

**Course type** : Engineering Science courses

**Course credit** : 05

**Pre-requisite** : Knowledge of physics and mathematics up to 12 science level.

**Rationale** : Basic Civil Engineering knowledge is essential for all Engineers

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
4	0	2	6	5	70	30	30	20	150

#### Course Objective :

- To enable learn about Building Planning and Construction
- To enable learn about Transportation Engineering
- To enable about basic of Surveying

#### Course Outcome :

After learning the course the students should be able to:

- Carry out simple land survey to prepare maps with existing details.
- Find out area of irregular shaped plane figures.
- Understand building plan elevation and section.
- Get acquainted with construction materials.
- Get acquainted with hydrological cycle and hydraulic structures.
- Get acquainted with mass transportation systems.





## Content

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Introduction</b> <b>Basic Understanding:</b> What is Civil Engineering / Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career. <b>History of Civil engineering:</b> Early constructions and developments over time; Ancient monuments &amp; Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers <b>Fundamentals of Building Materials:</b> Stones, bricks, mortars, timber, sand, Aggregates, Plain Reinforced &amp; Prestressed Concrete, Construction Chemicals; Structural steel, High Tensile Steel, Carbon Composites; Plastics in Construction</p>	10	20%
II	<p><b>Surveying, Leveling and Mapping:</b> <b>Introduction:</b> Definition of Surveying, Aims and applications, Fundamental principles of surveying, Classification of surveying, Plans and maps, Scales, Units of measurement. <b>Linear Measurement:</b> Methods, Instruments used in chain surveying, Selection of stations, Chaining, Ranging, Offsetting, Errors in chaining and correction, Conventional symbols. <b>Angular Measurement:</b> Instruments used, Types of compass, Types of meridians and bearings, Measurement of bearings, computation of angles. Compass traversing and correction of bearings for local attraction. <b>Leveling:</b> Aims and applications, Definition of various terms, Instruments for leveling, Methods of leveling, Recording observations in level-book, Computing reduced levels by HI and rise &amp; fall method, Definition of contour, Characteristics of contours of different terrains and application of contour maps, Introduction to planimeter, introduction to Global positioning system(GPS),</p>	20	40%
III	<p><b>Structural Engineering:</b> Types of buildings; tall structures; various types of bridges; Water retaining structures; Other structural systems; <b>Hydraulics, Hydrology &amp; Water Resources Engineering:</b> Fundamentals of fluid flow, basics of water supply systems; Underground Structures; Underground Structures Multipurpose reservoir projects</p>	10	20%
IV	<b>Traffic &amp; Transportation Engineering:</b> Investments in transport	05	15%





	infrastructure development in India for different modes of transport; Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems; Urban Public and Freight Transportation		
V	<b>Industrial lectures:</b> Case studies of large civil engineering projects by industry professionals, covering comprehensive planning to commissioning	<b>03</b>	<b>05%</b>

### Reference Books :

1. Basic Civil Engineering, Palanichamy, McGraw Hill
2. Basic Civil Engineering, Satheesh Gopi, Pearson Publishers
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain 16th Edition Publisher: Laxmi Publication Delhi
4. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
5. Building Construction and Construction Material Author: G.S. Birdie and T.D. Ahuja Publisher: Dhanpat Rai Publishing Company
6. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand
7. Building Construction Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain Publisher: Laxmi Pub. Delhi
8. Basic Civil Engineering M.S. Palanichamy

### Web Material Links:

1. <http://nptel.ac.in/courses/105107122/>
2. <http://nptel.ac.in/courses/105107157/>
3. <http://nptel.ac.in/courses/105101087/>
4. <http://nptel.ac.in/courses/105104100/>
5. [www.svnit.ac.in](http://www.svnit.ac.in)

### Practical / Activities :

1. Unit conversation Exercise
2. Chart preparation of various materials. Collection of rate and sample. (field visit)
3. Components of building (field visit)
4. Planning of a residential building ( plan, elevation & section of simple 1 room)
5. Linear and angular measurements (Chain and Compass) ( in field with instrument)
6. Introduction to Theodolite & total station
7. Determine R.L of given point by Dumpy level. ( in field with instrument)
8. Videos showing working of construction Equipment's
9. Presentation on BRTS / mass transportation system ( city bus)





10. Seminar on green building & smart city

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	-	-	-	3	3	2	3	2	2	1	1	-	2
CO-2	3	2	2	1	2	-	-	-	-	-	-	-	2	2
CO-3	3	2	2	1	2	-	-	-	-	-	-	-	2	3
CO-4	3	2	2	1	2	-	3	-	-	-	-	-	-	1
CO-5	3	2	2	1	2	-	-	-	-	-	-	-	-	-
CO-6	3	3	3	2	3	-	-	-	-	3	3	-	2	-







## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 1<sup>st</sup>

**Semester :** II

**Course title :** Computer Programming With C **Course code :** FEB120403

**Course type :** Engineering Science courses **Course credit :** 05

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
4	0	2	6	5	70	30	30	20	150

**Objective:** An introduction to computer concepts, logic, and computer programming. It starts from programming basics and gives a holistic view of the C Programming language, detailing all the aspects of the C language from data types, to operators and expressions, to if a statement, further to loops, arrays, strings and pointers. The course also provides hands-on training to help you write and test your coding skill, and prepare you for real-life application

Unit	Description in detail	Hours	Weightage
I	<b>Introduction to Computer and Programming:</b> Introduction, Architecture and functions of various components of computer, Concepts of Hardware and software, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high level programming, Algorithms, Flowchart, Programming Languages, Types of Languages <b>C Fundamentals:</b> Features of C Language, Basic Structure of C Program, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Declaration of Storage Classes ,Operators and Expressions,	10	20%







	Managing Input and Output Operations		
II	<p><b>Control Structure in C:</b> Simple if Statement nested if, if-else, Nesting of if Else, The Else if Ladder, switch-case, Looping constructs: for, while, do-while, Nesting Looping , break and continue, goto statement.</p> <p><b>Arrays and String:</b> One-dimensional arrays, Multi-dimensional arrays, String variables, Arithmetic Operations on Characters, Comparison of Strings, Table of Strings, String Storage, Built-in-string functions</p>	10	23%
III	<p><b>Functions:</b> Concepts of user defined functions, prototypes, definition of function, parameters, parameter passing, calling a function, recursive function, Macros, Pre-processing</p> <p><b>Recursion:</b> Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort , Merge sort.</p>	9	22%
IV	<p><b>Pointers:</b> Introduction, Understanding of pointers, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointers, Pointers expressions, Pointer increments and scale factor, Pointers and arrays, Pointers and Character Strings, Pointers on pointers, Pointer as function argument, Functions returning pointer, Pointers to functions, Pointers and structures.</p> <p><b>Dynamic Memory Allocation:</b> Introduction to Dynamic memory allocation, malloc, calloc and realloc</p>	8	19%
V	<p><b>Structure and Unions:</b> Introduction, Structures definition, Giving values to members, Structure initialization, Comparison of structure variables, Arrays of structures, Arrays within structure, Structure and function, Unions, Size of structures, Bit fields.</p> <p><b>File Management:</b> Introduction, Defining and opening a file, Closing a file, Input/output operations on files, Error handling during I/O operations, Random access to files, Command line arguments.</p>	8	16%

### Reference Books:

1. Programming in ANSI C by Balagurusamy, 7th Ed., Tata McGraw Hill
2. Programming with C, Second edition, by Gottfried, Tata McGraw-Hill Publishing Company Limited.
3. Let Us C by Yashvant Kanetkar, 12th Ed., BPB Publication
4. Programming in C by Ashok N. Kamthane, 2nd Ed., Pearson Education
5. Let us C, Yashavant P. Kanetkar, BBP Publications, Delhi
6. "Computer programming", Pearson Education, 2007 by Ashok N. Kamthane.



8. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing.

**Course Outcome:**

After learning the course the students should be able to:

CO-1: Understand the fundamentals and structure of a C programming language

CO-2: Apply the loops, arrays, functions and string concepts in C to solve the given problem

CO-3: Apply the pointers and text input output files concept to find the solution for the given applications.

CO-4: Use the Enumerated, Data types, Structures and Unions

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)												PSO-1	PSO-2
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12		
CO-1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	3	1	-	-	-	-	-	-	-	-	-	-	-
CO-3	-	3	1	-	-	-	-	-	-	-	-	-	2	-
CO-4	1	3		-	-	-	-	-	-	-	-	-	-	2

**Suggested List of Practical:**

1. Write a program to print —"GOKUL GLOBAL UNIVERSITY".
2. Write a program that reads two nos. from key board and gives their addition, subtraction, multiplication, division and modulo.
3. Write a program to find area of circle.
4. Write a C program to interchange two numbers.
5. Write a C program to enter a distance in to kilometer and convert it in to meter, feet, inches and centimeter.
6. Write a program to compute Fahrenheit from centigrade ( $f=1.8*c +32$ )
7. Write a C program to find that the accepted number is Negative or Positive or Zero.
8. Write a program to add two matrixes.
9. Write a program to read three numbers from keyboard and find out maximum out of these three (nested if else).



10. Write a program to read marks from keyboard and your program should display equivalent grade according to following table (if else ladder).

Marks	Grade
i. 100 – 80	Distinction
ii. 79 – 60	First Class
iii. 59 - 40	Second Class
iv. < 40	Fail

11. Write a C program to find out the Maximum and Minimum number from given 10 numbers

12. Write a C program to input an integer number and check the last digit of number is even or odd.

13. Write a C program to find factorial of a given number.

14. Write a program to reverse a number.

15. Write a program to generate first *n* number of Fibonacci series.

16. Write a program to calculate average and total of 10 students for 5 subjects (use nested *for* loops).

17. Write a program to check whether the given number is prime or not.

18. Write a C program to find  $1+1/2+1/3+1/4+....+1/n$ .

19. Write a program to print following patterns :

i) *	ii) *	iii) *****
**	* *	****
***	* * *	***
****	* * * *	**
*****	* * * * *	*

20. Write a program to print following patterns :

i) 1	ii) 55555
12	4444
123	333
1234	22
12345	1

21. Write a C program to read and store the enrollment no and marks of 20 students using array.

22. Write a program to find out which number is even or odd from list of 15 numbers using array

23. Write a program to find maximum element from One Dimensional array.

24. Write a program using pointer and function to determine the length of string.

25. Write a program using pointer to concate two strings.

26. Write a program using pointer to copy one string to another string.

27. Write a program to find a character from given string.





28. Write a program to replace a character in given string.
29. Write a program to delete a character in given string.
30. Write a program to reverse string.
31. Write a program to convert string into upper case
32. Write a program to store a character string in block of memory space created by malloc and then modify the same to store a large string.
33. Write a function in the program to return 1 if number is prime otherwise return 0.
34. Write a function Exchange to interchange the values of two variables, say x and y. illustrate the use of this function in a calling function.
35. Write a program to find factorial of a number using recursion.
36. Write a C program using global variable, static variable.
37. Write a program to read structure elements from keyboard.
38. Define a structure type *struct* personal that would contain person name, date of joining and salary using this structure to read this information of 5 people and print the same on screen.
39. Define a structure called cricket that will describe the following information:
  - a. Player name
  - b. Team name
  - c. Batting average
  - d. Using cricket, declare an array player with 50 elements and write a C program to read the information about all the 50 players and print team wise list containing names of players with their batting average.
40. Design a structure student record to contain name, branch and total marks obtained. Develop a program to read data for 10 students in a class and print them.
41. Write a program to print address of variable using pointer.
42. Write a C program to swap the two values using pointers.
43. Write a program to access elements using pointer.
44. Write a program to write a string in file
45. A file named data contains series of integer numbers. Write a c program to read all numbers from file and then write all odd numbers into file named "odd" and write all even numbers into file named "even". Display all the contents of these file on screen.
46. A program to illustrate reading files contents.
47. A program to illustrate the use of fgets( ).
48. A program to illustrate the use of fputc( ) and fputs( ).





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 1<sup>st</sup>

**Semester :** II

**Course title :** ENGINEERING GRAPHICS

**Course code :** FEB120204

**Course type :** Engineering Science courses

**Course credit :** 05

#### Teaching Examination Scheme :

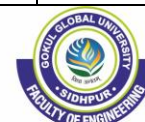
Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	4	7	5	70	30	30	20	150

**Objective:** Engineering Graphics is the language of communication for Engineers. Engineering Graphics course provides tools and techniques of communication for various fields of Engineering.

Sr.	Content	Total Hrs	% Weightage
1	<b>INTRODUCTION TO ENGINEERING GRAPHICS:</b> Scope of Engineering Drawing in all Branches of Engineering, Uses of Drawing Instruments and Accessories, Introduction to Drawing Standards BIS-SP-46, Representative Fraction, Types of Scales (Plain and Diagonal Scale), Dimensioning Terms and Notations, Types of Arrowheads, Lines, Lettering, Numbering and Dimensioning.	03	5%
2	<b>ENGINEERING CURVES:</b> Classification of Engineering Curves, Application of		



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	Engineering Curves, Constructions of Engineering Curves - Conics, Spirals, Involutives and Cycloids with Tangents and Normal.	<b>06</b>	<b>10%</b>
<b>3</b>	<b>PROJECTIONS OF POINTS AND STRAIGHT LINES:-</b> Introduction to principal planes of projections, Notation System- Points in First, Second, Third and Fourth quadrants, Projections of line Parallel to Two and Perpendicular to one of the principal planes, Line parallel to one and inclined to two principal planes, Line inclined to all the three principal planes, True length of the line and its inclination with the reference planes	<b>08</b>	<b>15%</b>
<b>4</b>	<b>PROJECTIONS OF PLANES:</b> Projections of various planes -Polygonal, Circular and Elliptical shape inclined to one of the Reference Plane and inclined to two Reference Planes; Concept of Auxiliary Plane of Projections.	<b>06</b>	<b>10%</b>
<b>5</b>	<b>PROJECTIONS OF SOLIDS AND SECTIONS OF SOLIDS:</b> Classifications of Solids, Projections of right and regular solids with their axis Parallel to Two and Perpendicular to one of the principal planes, axis parallel to one and inclined to two principal planes, axis inclined to all the three principal planes. Section of solids and the true shape of the section	<b>08</b>	<b>15%</b>
<b>6</b>	<b>DEVELOPMENT OF SURFACES:</b> Methods of Development of Lateral Surfaces of Right Regular Solids, Parallel Line Development and Radial Line Development, Applications of Development of Surfaces.	<b>08</b>	<b>15%</b>
<b>7</b>	<b>ORTHOGRAPHIC PROJECTIONS:</b> Projections on Principal Planes from Front, Top and Sides of the Pictorial view of an Object, First Angle Projection and Third Angle Projection method; Full Sectional Orthographic Views -Side and Front, Offset Cutting views.		<b>15%</b>







<b>8</b>	<p><b>ISOMETRIC VIEW/DRAWING AND ISOMETRIC PROJECTIONS:</b> Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing</p>	<b>15%</b>
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**References Books:-**

1. ENGINEERING GRAPHICS, P. J. Shah; S. Chand & Co., New Delhi Publications.
2. Engineering Drawing N.D. Bhatt & V.M. Panchal; Charotar Publishing House
3. Engineering Graphics – I and II By Arunoday Kumar Tech – Max Publication, Pune
4. A text book of Engineering Drawing By R.K.Dhawan, S.Chand & Company Ltd., New Delhi.
5. A text book of Engineering Drawing By P.S.Gill, S. K. Kataria & sons, Delhi.

**Course Outcome:-**

After Learning the course the students shall be able to:

- CO1** To know and understand the conventions and the method of engineering drawing.
- CO2** Identify the Drawing Symbols, Conventions used in Engineering Drawing
- CO3** Construct the Different types of Engineering Curves.
- CO4** To improve their visualization skills so that they can apply these skill in developing new products.
- CO5** Apply Descriptive Geometry Principles to Solve Engineering Problems Involving Points, Lines, Planes and Solids
- CO6** To improve their technical communication skill in the form of communicative drawings

<b>Course Outcomes</b>	<p><b>Expected Mapping with Programme Outcomes</b> (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)</p>	
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	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	2	-	-	-	-	-	-	-	-	-	2	-	-
CO-3	-	-	2	-	-	-	-	-	-	-	2	-	-	-
CO-4	-	-	-	-	-	-	-	2	-	-	-	-	-	-
CO-5	1	-	-	-	-	-	1	-	-	-	-	-	-	-
CO-6	-	-	2	-	-	1	-	-	-	-	-	-	-	-

**List of Suggested Practical:-**

1. Introduction to Engineering Graphics: Types of lines, Drawing Symbols, Numberings, Dimensioning Terms and, Title Block, Geometric Constructions etc.
2. Drawing Sheet on Scale.
3. Drawing Sheet on Engineering Curves.
4. Drawing Sheet on Projections of Points and Lines.
5. Drawing Sheet on Projections of Planes.
6. Drawing Sheet on Projections of Solids and Sections of Solids.
7. Drawing Sheet on Development of Surfaces.
8. Drawing Sheet on Orthographic Projections.
9. Drawing Sheet on Isometric Projection/View or Drawing.





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Approved By Govt. of Gujarat  
(Recognized by UGC under Section 22 & 2(f) of 1956)  
(Gujarat Private State University Act 4 of 2018)



**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 1<sup>st</sup>

**Semester** : II

**Course title** : Environmental Science

**Course code** : FEB120105

**Course type** : Mandatory Course

**Course credit** : 00

**Pre-requisite** : Interest in natural systems sustaining the life on the earth..

**Rationale** : To inculcate the environmental values translating into pro-conservation actions. Honorable Supreme Court of India has made it 'mandatory' to introduce a basic course on environmental at the undergraduate level

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	2	0	4	0	70	30	00	00	100

**Course Objective :**

1. To enable learn about Building Planning and Construction
2. To enable learn about Transportation Engineering
3. To enable about basic of Surveying

**Course Outcome :**

After learning the course the students should be able to:

CO-1 : Students are able to learn types of disasters and its profile in India..

CO-2 : Students are able to understand the causes and impacts of disasters on environment



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and related case studies of Global and National disasters.

CO-3 : Students are able to learn about risk reduction approaches of disasters with safety issues in mitigating industrial disasters..

CO- 4 : To understand the concept of Disaster Management Cycle and its Risk Reduction Measures

CO-5 : Students to learn the National Acts and policies for mitigating disasters, Role of Army, Police, Community, Corporate, Media etc. for post Disaster Management..

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<b>Introduction to Environmental Science:</b> Definition and Components of Environment, Relationship between the different components of Environment, Man and Environment relationship, Impact of technology on Environment, Environmental Degradation, Multidisciplinary nature of the Environment studies, its scope and importance in the present day Education System	03	10%
II	<b>Ecology and Ecosystems:</b> Ecology- Objectives and Classification , Concept of an ecosystem-structure and functions of ecosystem Components of ecosystem- Producers, Consumers, Decomposers Bio-Geo- Chemical Cycles- Hydrologic Cycle, Carbon cycle, Energy Flow in Ecosystem, Food Chains, Food webs, Ecological Pyramids.	04	15%
III	<b>Natural Resources &amp; Population:</b> Renewable and Nonrenewable resources, exploitation and conservation, Role of individual in conservation of natural resources. Population: Introduction, Reasons, Population Explosion & its Effects, Population forecast, Control Measures, Urbanization: Causes & Effects	06	20%
IV	<b>Environmental Pollution :</b> •Water Pollution Water Quality Standards, Sources of Water Pollution, Classification of Water pollutants, Effects of water pollutants •Air Pollution Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like PM, SO <sub>2</sub> , NO <sub>x</sub> Auto exhaust, Effects of common air pollutants. •Noise Pollution Introduction, Sound and Noise, Noise measurements, Causes and Effects •Solid Waste: Generation and Management •Bio medical Waste: Generation and Management •E-waste: Generation and management	08	30%





V	<p><b>Global Environmental Issue:</b> Sustainable Development, Climate Change, Global Warming and Green House Effect, Acid Rain, Depletion of Ozone layer, Carbon Footprint, Cleaner Development Mechanism (CDM), International Steps for Mitigating Global Change</p> <p><b>Basic Concept Of Green Building &amp; Smart Cities:</b> Green Building: Introduction, Objectives, Fundamental Principles, Benefits of Green Building, Examples of Green Building Smart Cities: Concept</p> <p><b>Concept of 4R's:</b> Principles &amp; Application of 4R's</p>	07	25 %
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### Reference Books :

1. Basics of Environmental Studies by Prof Dr N S Varandani ,2013 Publisher: LAP – Lambert Academic Publishing , Germany.
2. Environmental Studies by Anindita Basak ,2009 Publisher: Drling Kindersley(India)Pvt. Ltd Pearson
3. Environmental Studies by Deeksha Dave & S SKateva , Cengage Publishers.
4. Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher: John Wiley & Sons.
5. Environmental Studies by R. Rajagopalan, Oxford University Press
6. Environmental Studies by Benny Joseph, TMH publishers
7. Environmental Studies for Undergraduate Courses by Erach Bharucha Second edition,2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.

### Online Resources :MOEF, NPTEL

1. <http://elearning.vtu.ac.in/>
2. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

### Practical / Activities :

1. Introduction to Environment
2. Water Pollution
3. Air Pollution
4. Noise Pollution
5. Solid Waste
6. Bio-medical Waste
7. E-waste
8. Global Environmental Issues





9. Concept of Green Building
10. Concept of Smart Cities
11. Concept of 4R's

Course Outcomes	Expected Mapping with Programme Outcomes													
	<i>(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)</i>													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-4	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO-5	1	-	-	-	-	-	-	-	-	-	-	-	-	-







## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 2<sup>nd</sup>

**Semester** : III

**Course title** : Effective Technical  
Communication

**Course code** : FEB130001

**Course type** : Humanities and Social Sciences

**Course credit** : 03

**Pre-requisite** : Zeal to learn the subject

**Rationale** : The rationale of the curriculum is to help students learn technical communication along with necessary moral and ethical dimensions of engineering

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150

#### Course Objective :

- Technical communication is necessary because it can provide a more efficient working environment.

#### Course Outcome :

1. Define and discuss dynamics of Verbal and Non Verbal aspects of Communication
2. Write various formal documents of technical and professional communication
3. Communicate in diverse formal situations taking place in organizations
4. Illustrate and examine the knowledge of ethical aspects of engineering
5. Demonstrate and explain social and professional etiquettes
6. Plan self-development and practice self-assessment





## Content

Sr.	Content	Total Hrs	% Weightage
1	<b>Dynamics of Communication:</b> Definition and process Kinesics Proxemics Paralinguistic features Importance of Interpersonal and Intercultural Communication in today's organizations	06	20%
2	<b>Technical Writing:</b> Report writing, Technical proposal, Technical description, Business letters(sales, order, complaint, adjustment, inquiry, recommendation, appreciation, apology, acknowledgement, cover letter) Agenda of meeting, Minutes of meeting, Resume writing	08	25%
3	<b>Technical Communication:</b> Public speaking, Group discussion Presentation strategies, Interview skills, Negotiation skills, Critical and Creative thinking in communication Interfacing Concepts, Ports, Interfacing Of I/O Devices, Interrupts In 8085, Programmable Interrupt Controller 8259A, Programmable Peripheral Interface 8255A	06	20%
4	<b>Ethics in Engineering:</b> Scope of engineering ethics Accepting and sharing responsibility Responsible professionals and ethical corporations Resolving ethical dilemmas Making moral choices	10	12%
5	<b>Etiquettes:</b> Telephone etiquettes, Etiquettes for foreign business Trips Visits of foreign counterparts Etiquettes for small talks Respecting privacy Learning to say NO Time management <b>Self-development and Assessment:</b> Change, Grow, Persist, Prioritize, Read, Learn, Listen, Record, Remember, Assess, Think, Communicate, Relate, Dream	08	23%

### Reference Books :

1. Raman and Sharma, Technical Communications, OUP, New Delhi, 2017
2. Lata and Kumar, Communication Skills, OUP, New Delhi, 2018
3. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, New York, 2014
4. Mohapatra and Sreejesh S., Case Studies in Business Ethics and Corporate Governance, Pearson, UP, 2013
5. Ramesh and Ramesh, The Ace of Soft Skills, Pearson, UP, 2019





6. Sheffield, Montgomery and Moody, Cornerstone: Developing Soft Skills, UP, 2009

**Online Resources :**

[www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

**Practical / Activities :**

1. Role Play
2. Letter writing: Formal
3. Group Discussion.
4. Presentations
5. Book Review(Preferably related to self-development)
6. Mock Interview.
7. Report writing
8. Case studies related to unit 4, 5 and 6
9. Conducting meetings and minutes of meeting
10. Practical assessment

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	1	2	-	2	-	-	2	-	2	-	-	-	-	-
CO-2	-	-	1	2	-	1	-	1	-	2	1	1	-	-
CO-3	2	1	-	-	1	1	-	1	1	1	1	-	-	-
CO-4	-	1	2	-	-	1	1	2	2	1	1	1	-	-
CO-5	1	-	-	1	-	-	1	1	1	-	1	2	-	-
CO-6	1	1	1	-	1	1	-	-	2	2	-	2		





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** :Bachelor of Engineering

**Subject / Branch** :Civil Engineering

**Year** :2<sup>nd</sup>

**Semester** :II

**Course title** : INDIAN CONSTITUTION

**Course code** : FEB130002

**Course type** : Mandatory course

**Course credit** : 0

**Pre-requisite** : Nil

**Rationale** :Nil

**Teaching Examination Scheme** :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
02	00	00	02	0	50	00	00	00	50

**Course Objective** :

1. The main objectives of the Indian constitution include sovereignty, socialism, secularism, democracy, and republic.
2. Students become aware of their basic human rights and how these human rights manifest in our Constitution
3. To provide understanding of various constitutional aspects like constitution of panchayat, municipalities, co-operative societies, elections provisions, amendment procedure etc.



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### Course Outcome :

After learning the course the students should be able to:

1. Enhance human values , create awareness about law enactment and importance of Constitution
2. To Understand the Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social Responsibilities.
3. Create Awareness of their Surroundings, Society, Social problems and their suitable solutions while keeping rights and duties of the citizen keeping in mind.
4. Understand distribution of powers and functions of Local Self Government.
5. Understand the National Emergency, Financial Emergency and their impact on Economy of the country.

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Meaning of the constitution law and constitutionalism :</b> Meaning of the constitution law and constitutionalism</p> <p><b>History of Indian Constitution :</b> Background, Timeline of Formation of IC, Constituent Assembly, Membership, Drafting, Provision of Preamble, Implementation</p> <p><b>Salient features and characteristics of the Constitution of India</b> Structures – Parts, Schedules &amp; Articles, Appendix, Influence of other constitution, Special characteristics</p>	5	18%
II	<p><b>Fundamental Rights</b> History, Right to Freedom, Right to Equality, Right against Exploitation, Right to Freedom of Religion, Right to Education &amp; Culture, Right to Constitutional Remedies</p> <p><b>Right to Equality under Article –14</b> Background, Provisions given under the article, Case – studies</p> <p><b>Right to certain Freedom under Article 19</b> Background, Provisions given under the article, Case – studies</p>	6	21%
III	<p><b>Scope of the Right to Life and Personal Liberty under Article 21</b> Background, Provisions given under the article, Case – studies</p> <p><b>Fundamental Duties and its legal status</b> Background, Article 51-A, Implementations, Case – studies</p> <p><b>The Directive Principles of State Policy – Its importance and Implementation</b> Background, Part 4, , Article – 36, 41, 43, 44, 45,48, 48A, 51, Implementations</p>	5	18%
IV	<b>Federal structure and distribution of legislative and financial</b>	7	25%





	<p><b>powers between the Union and the States (PART - I)</b> Political, Economic and Constitutional relations between the Union and States, Union List over the State List and the Concurrent List <b>Parliamentary Form of Government in India –The constitution powers and status of the President of India</b> History of Parliament, Houses of Parliament, Powers Article 53, Powers and Duties : Legislative, Executive, Judicial, Appointment, Financial, Diplomatic, Military, Pardoning, Emergency, Selection &amp; Election Process <b>Powers and Procedure for Amendments in Indian Constitution</b> Background, Types, Procedure, Responsible Article</p>		
V	<p><b>History of amendments in Indian Constitutional</b> Key amendments in Indian constitution <b>Emergency Provisions: National Emergency, President Rule, Financial Emergency</b> Background, Types, Procedure, Responsible Article <b>Local Self Government –Constitutional Scheme in India</b> Background, Brief History : GVK Rao Committee, L.M Singhvi Committee, Timeline of Formation, Present scenario, Functions</p>	5	18%

**Reference Books :**

1. Constitutional Law of India, Dr. J.N. Pandey, Central Law Agency
2. Introduction to the Consitution of India, Durga Das Basu, LexisNexis.
3. Indian Constitutional Law, M.P. Jain, LexisNexis
4. V.N.Shukla’s Constitution of India, Mahndra Pal Singh, Eastern Book Company
5. Constitutional Law – I Structure, Udai Raj Rai, Eastern Book Compan

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	-	-	-	-	--	2	-	1	1	-	-	1	-	-
CO-2	-	-	-	-	-	1	-	1	1	-	-	2	-	-
CO-3	-	-	-	-	-	1	1	1	1	-	-	2	-	-
CO-4	-	-	-	-	-	1	-	1	1	-	-	2	-	-
CO-5	-	-	-	-	-	2	-	1	1	-	-	3	-	-







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**Gokul Global University, Siddhpur.**

**Faculty of Engineering**



**Program:** Bachelor of Engineering

**Subject / Branch:** Civil

**Year :** 2023

**Semester:** III

**Course title :** Engineering mathematics-III

**Course code :** FEB130101

**Course type :** Basic Science Courses

**Course credit :** 03

**Pre-requisite :** Geometry, Trigonometry, Calculus and ODE

**Rationale :** This subject is a powerful tool for solving a wide array of applied problems.

**Teaching Examination Scheme:**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150

**Course Objective:**

1. To develop logical understanding of the subject.
2. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
3. To make aware students about the importance and symbiosis between Mathematics and Engineering.



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**Course Outcome:**

After learning the course the students should be able to:

- CO-1:** convert complex number in a polar form, plot the roots of a complex number in complex plane, find harmonic conjugate of analytic functions and apply conformal mapping in geometrical transformation
- CO-2:** evaluate complex integration by using various results, test convergence of complex sequence and series and expand some analytic function in Taylor’s series
- CO-3:** find Laurent’s series and pole of order, and apply Cauchy Residue theorem in evaluating some real integrals
- CO-4:** understand the central tendency methods and apply it in civil problems
- CO-5:** find unknown value of given data by using various interpolation methods and curve fitting
- CO-6:** calculate integration and solve differential equations by using numerical methods

**Content**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
1	<b>Vector spaces</b> Vector Space, linear dependence of vectors, basis, dimension, Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map	04	12%
2	<b>Partial Differential Equations</b> First order partial differential equations, solutions of first order linear and non-linear PDEs, Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method, Flows, vibrations and diffusions, second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems), D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation, Separation of variables method to simple problems in	06	14%





	Cartesian coordinates		
3	<p><b>Complex Variable</b> Differentiation, Cauchy-Riemann equations, analytic functions, Harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm), Conformal mappings, Mobius transformations and their properties, Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour</p>	09	22%
4	<p><b>Numerical Methods</b> Solution of polynomial and transcendental equations, Bisection method, Newton-Raphson method, Regula-Falsi method, Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae, Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae, Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules, Ordinary differential equations: Taylor's series, Euler and modified Euler's methods, Runge-Kutta method of fourth order for solving first and second order equations</p>	11	26%
5	<p><b>Discrete Mathematics</b> Fourier transforms, Z-transform and Wavelet transforms, properties, methods, inverses and their applications, Basic operations on sets, Cartesian products, disjoint union (sum), and power sets, Different types of relations, their compositions and inverses, Different types of functions, their compositions and inverses, Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc, Decision problems of</p>	11	26%





	propositional logic. Introduction to first order logic and first order theory, Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices. Boolean and pseudo Boolean lattices, Algebraic structures with one binary operation – semigroup, monoid and group, Cosets, Lagrange’s theorem, normal subgroup, homomorphic subgroup, Congruence relation and quotient structures. Error correcting code		
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### Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley and Sons.
2. J. W. Brown and R. V. Churchill, Complex Variables and Applications, McGraw Hill.
3. Peter O'Neill, Advanced Engineering Mathematics, 7th Edition, Cengage.
4. Dennis G. Zill, 4th edition, Advanced Engineering Mathematics, 4th Edition, Jones and Bartlett Publishers.
5. Dennis G. Zill, Patrick D. Shanahan, A First Course in Complex Analysis with Applications, Jones and Bartlett Publishers.
6. S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.
7. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010
9. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).

### Suggested Readings :

1. Swaym video lecture.
2. Mathematics magazine

### Online Resources :

1. <http://nptel.ac.in>
2. <https://ocw.mit.edu/courses>
3. <https://www.edx.org>

### Practical / Activities :





1. Problems solving.
2. Tutorial solving.
3. Seminar by students.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	1	1	1	-	-	-	-	1	1	-	-	-	-
CO-2	1	1	2	-	2	-	-	-	-	-	-	-	-	-
CO-3	1	-	-	2	-	-	-	-	1	-	-	1	-	-
CO-4	-	2	-	-	1	-	-	-	-	1	-	-	-	-
CO-5	1	-	1	-	-	-	-	-	-	-	-	-	-	-
CO-6	2	-	-	1	-	-	-	-	2	1	-	1	-	-





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 2<sup>nd</sup>

**Semester** : III

**Course title** : Building Construction &  
Technology

**Course code** : FEB130102

**Course type** : Professional core courses

**Course credit** : 05

**Pre-requisite** : Student shall have studied basic Elements of Civil Engineering

**Rationale** : To develop capability to understand building components and technology

**Teaching Examination Scheme** :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
04	00	02	06	05	70	30	30	20	150

**Course Objective** :

1. Develop technical and job skills related to careers in the construction industry.
2. Develop teamwork and problem solving skills necessary in the construction industry
3. Develop and use proper safe work practices in accordance with OSHA standards for the construction industry.



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### Course Outcome :

After learning the course the students should be able to:

- CO-1: To identify various components of building structures
- CO-2: To propose suitable type of foundation for building structures
- CO-3: To select suitable type of masonry for building structures
- CO-4: To propose relevant means of communications for different types of buildings
- CO-5: To select relevant material for finishing works

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Introduction:</b> Overview of construction practices, theory and methods.</p> <p><b>Subsurface Investigation:</b> Objectives, methods of boring like wash boring, percussion etc.,</p> <p><b>Shallow Foundations:</b> Necessity, types, Setting out, Excavation, Construction, Failures of foundation and Remedial measures.</p>	12	24%
II	<p><b>Masonry Construction:</b></p> <p>A) Stone masonry: Technical terms, lifting appliances, joints, types – random (un-coursed) rubble, coursed rubble, dry rubble masonry, Ashlar masonry- Ashlar fine, chamfered fine.</p> <p>B) Brick masonry: Technical terms, bonds in brick work- English bond, single &amp; double Flemish bond, garden wall bond, raking bond, Dutch bond.</p> <p>C) Composite masonry: Stone facing with brick backing, brick facing with concrete backing.</p> <p>D) Hollow concrete blocks and construction</p> <p>E) Cavity walls: Brick cavity walls, position of cavity at foundation, roof and at opening levels.</p> <p>F) Lintels &amp; arches: Lintels – types, construction. Arches – technical terms, types – brick arches, rough, axed, stone arches, flat – semicircular.</p> <p>G) Plain and Reinforced Concrete Construction: Pre-cast and cast-in-situ Construction.</p>	08	18%



III	<b>Doors and Windows:</b> <b>A) Doors:</b> Location, technical terms, size, types, construction, suitability. <b>B) Windows:</b> Factors affecting selection of size, shape, location and no. of windows, types, construction, suitability, fixtures and fastenings. <b>C) Ventilators:</b> Ventilators combined with window, fanlight. <b>Stairs and Staircases:</b> Definition, technical terms, requirements of good stair, fixing of going and rise of a step, types of steps, classification, example – stair Planning, elevators, escalators.	10	22%
IV	<b>Floorings:</b> Introduction, essential requirements of a floor, factors affecting selection of flooring material, types of ground floors, brick, flag-stone, tiled cement concrete, granolithic, terrazzo, marble, timber flooring, upper floor- timber, timber floor supported on RSJ flag stone floor resting on RSJ, jack arch floor, reinforced concrete floor, ribbed floor, pre-cast concrete floor. <b>Roofs and Roof Coverings:</b> Introduction, requirements of good roof technical terms, classification, types of roof coverings for pitched roof. A.C. sheet roofs – fixing of A.C. sheets, laying of big six sheets, G.I. Sheets roofs, slates, flat roof – advantages, dis-advantages, types of flat terraced roofing. <b>Wall Finishes:</b> Plastering, pointing and painting	12	24%
V	<b>Coffer Dams:</b> Definition, uses, selection of coffer dams, types of coffer dams, design features of coffer dams; leakage prevention, economic height <b>Caissons:</b> Definition, uses, construction material, types of caissons, loads on caisson, design features of caissons, floating of caissons, cutting edges, sinking of caisson, tilting of caisson, caisson diseases.	06	12%

### Reference Books :

1. Building Construction by Dr. B. C. Punamia
2. Building Construction by SushilKumar
3. Building Construction by Gurcharan Singh
4. Building Construction by S. C. Rangwala
5. Building Construction by P.C Varghese, Prentice-Hall of India, New Delhi
6. Indian Standard Institution, National Building Code of India, ISI, 1984, New Delhi

### Online Resources :

[www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)



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**Practical / Activities :**

- Assignment -1: Foundations & Setting Out work
- Assignment -2: Masonry Construction
- Assignment -3: Plain and Reinforced Concrete Construction
- Assignment -4: Doors and Windows
- Assignment -5: Stairs and Staircases
- Assignment -6: Floorings
- Assignment -7: Roofs and Roof Coverings
- Assignment -8: Temporary Works
- Assignment -9: Caissons
- Assignment -10: Coffers dams

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	1	1	2	-	1	1	-	1	-	3	1
CO-2	3	3	3	1	2	1	-	1	1	-	-	-	2	-
CO-3	3	2	3	1	1	1	-	1	1	-	-	-	2	-
CO-4	3	2	2	1	1	-	-	-	-	2	-	-	-	-
CO-5	3	1	1	1	-	-	-	1	-	-	-	-	-	-





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 2<sup>nd</sup>

**Semester** : III

**Course title** : Engineering Geology

**Course code** : FEB130103

**Course type** : Professional core courses

**Course credit** : 03

**Pre-requisite** : Nil

**Rationale** : Geotechnics is required to equip the students to understand the properties and behavior of soil for the design of structures. To introduce students with basic principles of geosciences and their applications in civil engineering

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
02	00	02	04	03	70	30	30	20	150

**Course Objective :**

- To study about the protection of life and property against damage caused by various geological conditions.
- Study the formation of earth sphere
- Initial structure of earth



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### Course Outcome :

After learning the course, the students shall be able to:

1. Know soil formation, types of soils, types of soils found in various parts of India.
2. Determine the index properties and interrelationships between various soil parameters.
3. Understand the different types of soil classification systems. Classify field soils as per particle size and atterberg's indices.
4. Know types of soil water found in nature, it's permeability characteristics and seepage determination.
5. Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<b>MODULE 1: -</b> Branches and Scope of geology	<b>03</b>	<b>12%</b>
II	<b>MODULE 2: -</b> <b>Physical Geology:</b> Branches and scope of Geology; Surface processes and landforms: Weathering and Erosion; Introduction to geological agents (river, wind, oceans, glaciers, groundwater) and their actions (erosion, transport and deposition). Interior of the Earth: internal structure of earth, study of core, mantle and crust of the Earth. Processes responsible for volcanism (Process of volcanic eruption, types of volcanoes and volcanic hazard) and earthquake (Causes of earthquake occurrence, Distribution (seismic zoning), Seismo-tectonic setup of India, seismic hazard: Tsunamis, Active fault rupture, liquefaction). Plate Tectonics: Introduction to the concept of plate tectonics, mechanism responsible for plate movement, types of plate boundaries, processes and features associated with plate boundaries. Continental drift and sea floor spreading.	<b>05</b>	<b>38%</b>
III	<b>MODULE 3: -</b> <b>Mineralogy and Petrology:</b> Physical properties of minerals, major rock forming minerals, occurrence and use of minerals. Introduction to major rock types (Igneous, sedimentary and metamorphic rocks); their genesis, classification and structures; engineering properties of rocks, advantages and disadvantages of different rock types at construction	<b>05</b>	
IV	<b>MODULE 4: -</b>	<b>08</b>	<b>31%</b>







	<b>Structural geology:</b> Introduction to primary and secondary geological structures. Study of geological faults, folds, joints and active faulting. Their origin, types and engineering consideration. Geological mapping: study of Strike and dip using models and numerical problems, preparation of geological cross section <b>Hydrogeology:</b> Hydrological cycle and groundwater occurrence		
V	<b>MODULE 5: - Geology in Civil Engineering:</b> Geological investigations during planning for tunnels, dams-reservoirs-runways-roads and buildings. Landslide and mass movement: Introduction, types, mitigation and prevention of landslide and mass movement. Remote sensing and Geographical Information System (GIS): Introduction to remote sensing and GIS, use of remote sensing and GIS in geological investigations and geological hazard mitigation	05	19%

#### Reference Books :

1. Engineering Metrology and Measurement, N V Raghavendra and Krishnamurthy, Oxford University Press,
2. Engineering Metrology and Measurements, Bentley, Pearson Education.
3. Theory and Design for Mechanical Measurements, 3 rd. Edition, Richard S Figliola, Donald E Beasley, Wiley India.
4. Metrology and Measurement, Anand Bewoor & Vinay Kulkarni McGraw-Hill
  - a. Text/Reference Books:
5. Engineering and General Geology, Parbin Singh, 8th Edition (2010), S K Kataria & Sons.
6. Text Book of Engineering Geology, N. Chenna Kesavulu, 2 nd Edition (2009),
7. Macmillan Publishers India.
8. Geology for Geotechnical Engineers, J.C. Harvey, Cambridge University Press (1982)

#### Online Resources :

1. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)





### Practical / Activities :

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group:
5. Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite;
6. Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole
7. group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet,
8. Galena, Gypsum.
9. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties,
10. Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock:
11. Gabbro, Dolerite, Basalt and its varieties, Trachyte.
12. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its
13. varieties, Laterite, Limestone and its varieties, Shales and its varieties.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	2	3	2	2	1	-	-	-	-	-	2	1
CO-2	3	3	2	1	1	-	1	-	-	-	-	-	2	2
CO-3	3	-	-	1	1	-	-	-	-	-	-	-	-	1
CO-4	3	-	-	2	-	-	1	-	-	-	-	-	-	1
CO-5	2	2	2	1	2	1	-	1	1	-	-	2	1	1



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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 2<sup>nd</sup>

**Semester** : III

**Course title** : Mechanics Of Solids

**Course code** : FEB130104

**Course type** : Engineering Science Courses

**Course credit** : 05

**Pre-requisite** : Nil

**Rationale** : The branch of Applied science that deals with state of rest or the state of motion is termed as Mechanics. Starting from the analysis of rigid bodies under gravitational force and simple applied forces the mechanics has grown to the analysis of robotics, aircrafts, space crafts under dynamic force, atmospheric forces, temperatures forces etc. The principal of mechanics developed around state of rest and state of motion of the bodies by Sir Issac Newton which is termed as three laws of motion and the laws of gravitation. The mechanics based on these laws are called classical mechanics or Newtonian mechanics. Engineers are keen to use laws of mechanics to actual field problems. Application of laws of mechanics to field problems is termed as engineering mechanics. Here the students will learn the laws and principals of mechanics along with their applications to engineering problems. As a matter of fact knowledge of mechanics of solids is very essential for an engineer in planning, designing and construction of various types of structures and machines, so that the design is safe and economical

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
04	00	02	06	05	70	30	30	20	150



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**Course Objective :**

- Students will be able to understand basic concepts of stress, strain and their relations based on linear elasticity.
- Students will understand how to calculate normal and shear stresses.

**Course Outcome :**

1. Apply fundamental principles of mechanics, equilibrium and statics to practical problems of engineering.
2. Determine centroid and moment of inertia of a different geometrical shape and its use in engineering problem.
3. Apply the law of statics friction in simple applications
4. Determine different types of stresses and strains developed in the member subjected to axial, bending, shear, torsion & thermal loads.
5. Differentiate behavior and properties of different engineering materials.
6. Apply the basics of simple machines and their working mechanism

**Content**

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Introduction</b> Definition of space, time, particle, rigid body, deformable body. Force, types of forces, Characteristics of a force, System of forces, Composition and resolution of forces. Fundamental Principles of mechanics: Principle of transmissibility, Principle of superposition, Law of gravitation, Law of parallelogram of forces, Newton’s Laws of Motion</p> <p><b>Fundamentals of Statics</b> Coplanar concurrent and non-concurrent force system: Resultant, Equilibrant, Free body diagrams. Coplanar concurrent forces: Resultant of coplanar concurrent force system by analytical and graphical method, Law of triangle of forces, Law of polygon of forces, Equilibrium conditions for coplanar</p>	14	25%





II	<p><b>Applications of fundamentals of statics Statically determinate beams:</b> Types of loads, Types of supports, Types of beams; Determination of support reactions, Relationship between loading ,shear force &amp; bending moment, Bending moment and shear force diagrams for beams subjected to only three types of loads :i)concentrated loads ii) uniformly distributed loads iii) couples and their combinations; Point of contra flexure, point &amp; magnitude of maximum bending moment, maximum shear force</p> <p><b>Stresses in Beams:</b> Flexural stresses – Theory of simple bending, Assumptions, derivation of equation of bending, neutral axis, determination of bending stresses, section modulus of rectangular &amp; circular (solid &amp; hollow), I,T,Angle, channel sections Shear stresses – Derivation of formula, shear stress distribution across various beam sections like rectangular, circular, triangular, I, T,angle sections.</p>	11	25%
III	<p><b>Centroid and moment of inertia and mass moment of inertia Centroid:</b> Centroid of lines, plane areas and volumes, Examples related to centroid of composite geometry, Pappus – Guldinus first and second theorems.</p> <p><b>Moment of inertia of planar cross-sections:</b> Derivation of equation of moment of inertia of standard lamina using first principle, Parallel &amp; perpendicular axes theorems, polar moment of inertia, radius of gyration of areas, section modulus. Examples related to moment of inertia of composite geometry.</p> <p><b>Torsion:</b> Derivation of equation of torsion, Assumptions, application of theory of torsion equation to solid hollow circular shaft, torsional rigidity</p>	14	25%
IV	<p><b>Simple stresses &amp; strainsBasics of stress and strain:</b> 3-D state of stress (Concept only)Normal/axial stresses: Tensile &amp; compressive</p> <p><b>Tangential Stresses:</b> Shear and complementary shearStrains: Linear, shear, lateral, thermal and volumetric.Hooke’s law, Elastic Constants: Modulus of elasticity, Poisson’s ratio,Modulus of rigidity and bulk modulus and relations between themwith derivation.Application of normal stress &amp; strains: Homogeneous and composite bars having uniform &amp; stepped sections subjected to axial loads andthermal loads, analysis of homogeneous prismatic bars undermultidirectional stresses</p>	10	20%
V	<p><b>Principle stresses:</b></p>	04	05%





<p>Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr's circle of stress, ellipse of stress and their applications.</p> <p><b>Physical &amp; Mechanical properties of materials: (laboratory hours)</b> Elastic, homogeneous, isotropic materials; Stress –Strain relationships for ductile and brittle materials, limits of elasticity and proportionality, yield limit, ultimate strength, strain hardening, proof stress, factor of safety, working stress, load factor, Properties related to axial, bending, and torsional &amp; shear loading, Toughness, hardness, Ductility This portion, Brittleness</p> <p><b>Simple Machines: (laboratory hours)</b> Basics of Machines, Definitions: Velocity ratio, mechanical advantage, efficiency, reversibility of machines. Law of Machines, Application of law of machine to simple machines such as levers, pulley and pulley blocks, wheel and differential axle, Single purchase, double purchase crab, screw jacks. Relevant</p>		
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#### Reference Books :

1. Engineering Mechanics statics by R. C. Hibbeler, McMillan Publication.
2. Engineering Mechanics by R S Khurmi
3. Engineering Mechanics by S SBhavikatti
4. Mechanics for Engineers - Statics Fourth Edition, by F. P. Beer and E. R. Johnson
5. Engineering Mechanics, 2nd ed. — MK Harbola
6. Introduction to Mechanics — M K Verma
7. An Introduction to Mechanics — D Kleppner & R Kolenkow
8. Principles of Mechanics — JL Synge & BA Griffiths
9. Mechanics — JP Den Hartog
10. Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
11. Engineering Mechanics by Shames I. H., P H I India.
12. Mechanics of Structure Vol. I S. B. Junnarkar & H. J. Shah
13. Mechanics of Materials E. P. Popov
14. Strength of Materials G. H. Ryder
15. Mechanics of Materials Timoshenko and Gere
16. Mechanics of Materials Beer and Johnston.
- 17.

#### Online Resources :

[www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

#### Practical / Activities :



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The students will have to solve at least five examples and related theory from each topic as an assignment/tutorial. Students will have to perform following experiments in laboratory and prepare the

laboratory manual.

Mechanics of rigid body

1. Equilibrium of coplanar concurrent forces
2. Equilibrium of coplanar non-concurrent forces
3. Equilibrium of coplanar parallel forces: Determination of reactions of simply supported beam
4. Verification of principle of moment: Bell crank lever
5. Determination of member force in a triangular truss
6. Determination of parameters of machines (Any two)
  - (a) Wheel and differential axles
  - (b) Single purchase crab
  - (c) Double purchase crab
  - (d) System of pulleys

**Major Equipment's:**

1. Force table
2. Beam set up
3. Truss set up
4. Bell crank lever
5. Friction set up
6. Lifting machine
7. Hardness testing machine
8. Impact testing machine
9. Universal testing machine with shear attachment

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	2	2	1	-	-	-	-	-	-	-	2	2
CO-2	3	3	2	1	1	-	-	-	-	-	-	-	2	1
CO-3	3	2	2	1	-	-	-	-	-	-	-	-	2	2
CO-4	2	2	2	1	-	-	-	-	-	-	-	-	2	2
CO-5	3	2	-	1	-	-	1	-	1	-	-	-	2	1
CO-6	3	2	-	1	1	-	-	-	-	-	-	-	2	2







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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 2<sup>nd</sup>

**Semester :** IV

**Course title :** Essence Of Indian Traditional Knowledge

**Course code :** FEB 140001

**Course type :** Indian Traditional Core Courses

**Course credit:** 0

**Pre-requisite :** Sanskrit Knowledge

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	0	2	0	70	30	00	00	100

**Course Objective :**

1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
3. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.



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### Course Outcome :

After successful completion of the course the students shall be able to:

1. Ability to understand, connect up and explain basics of Indian Traditional knowledge modern scientific perspective
2. Identify the concept of Traditional knowledge and its importance. Explain the need and importance of protecting traditional knowledge.
3. Explain the need and importance of protecting traditional knowledge
4. Illustrate the various enactments related to the protection of traditional knowledge.
5. Interpret the concepts of Intellectual property to protect the traditional knowledge
6. Explain the importance of Traditional knowledge in Agriculture and Medicine.

### Content

Sr.No	Content	Teaching hr	% Weightage
1	Basic Structure of Indian Knowledge System (i) वेद, (ii) उन्नवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थानत्यआदद) (iii) वेदांग (शिक्षा, कल्म, ननरुत, व्याकरण, ज्योनतष, छंद), (iv) उन्नाइग (धर्म,शास्त्र,मीमांशा,पुराण,तर्कशास्त्र )	24	60%
2	Modern Science and Indian Knowledge System.	06	15%
3	Yoga and Holistic Health care	06	15%
4	Case Studies	04	10%

### Reference Books :

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. Fritzof Capra, Tao of Physics
4. Fritzof Capra, The wave of Life





5. V N Jha ( Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Amaku,am
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
7. GN Jha ( Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, VidyanidhiPrakasham, Delhi, 2016
8. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, VidyanidhiPrakasham, Delhi, 2016
9. P R Sharma ( English translation), ShodashangHridayam

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	1	-	-	-	2	2	2	2	2	1	1	1	-	-
CO-2	2	2	2	1	1	-	-	1	-	2	-	-	-	-
CO-3	-	1	-	1	1	-	1	-	-	2	-	-	-	-
CO-4	1	1	2	-	-	2	2	-	-	-	-	1	-	-
CO-5	2	2	1	2	2	-	-	-	-	1	-	-	-	-
CO-6	-	1	-	2	-	1	-	1	-	2	1	1	-	-





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 2<sup>nd</sup>

**Semester** : IV

**Course title** : Building & Town Planning

**Course code** : FEB140101

**Course type** : Professional Core Course

**Course credit** : 04

**Pre-requisite** : Elements of drawing, primary knowledge of surveying, levelling and computer

**Rationale** : A Civil Engineer has to be conversant with building and town planning and their development controls, skill of preparing drawings of various types like, orthographic, perspective, working drawings etc. using software application

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	4	6	4	70	30	30	20	150

**Course Objective :**

- To get maximum benefit from building and its services in terms of quality, timely completion and cost-effectiveness.
- To compile different aspects of Building Construction, Planning and Drawing of residential buildings & Public Building

**Course Outcome :**

After learning the course the students should be able to



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1. Comprehend local building bye-laws and provisions of National Building Code in respect of building and town planning resulting in functionally efficient, economically viable and legally acceptable buildings.
2. Discuss and apply various aspects of principles of building planning and town planning
3. Understand and implement various aspects of Principles of Architectural composition
4. Explain the principles of planning and design considerations to construct earthquake resistant building
5. Understand, interpret and prepare working drawings, foundation plans, perspective drawing and other executable drawings and prepare the drawing using software

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<b>INTRODUCTION TO BUILDINGS:</b> Detailed study of Principles of building planning (with case study), Orientation of building, Principles of architecture composition, Fundamentals of Building Information Modelling (BIM)	05	18%
II	<b>BUILDING BY-LAWS AS PER NATIONAL BUILDING CODE:</b> Building by-laws of local authority, Standards for Residential, Public, Commercial, Industrial And Institutional Buildings Planning, Planning of Earth Quake Resistant Building, overview of RERA (Real Estate Regulatory Authority) and ODPS (Online Development Permission System)	05	18%
III	<b>SYMBOLS AND SIGN CONVENTIONS:</b> Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards <b>BUILDING DRAWING:</b> Planning and Preparing working drawing of Residential Building with scale proportion, Layout of Public Building, Industrial Building etc., Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan. Roof drainage plans. Provision of Building services (like water supply, drainage, electrification, etc.), software application in building planning and building Drawing for 2D model generation,	07	24%





IV	<b>PICTORIAL VIEW:</b> Principles of isometrics and perspective drawing. Perspective view of building. Fundamentals of Building Information Modelling (BIM) <b>HISTORY OF TOWN PLANNING :</b> Historical aspects and origin of Town Planning in the World and in India, Necessity of Civic surveys for Planning purpose, types, data and its presentation and analysis, Fundamental principles of Town Planning.	06	22%
V	<b>TOWN PLANNING:</b> Components of town such as Land use, Zones, Road Network, CBD, Neighbourhood planning, Development controls for new town planning schemes for growth negotiation, Formation of Slums, Causes of Slum formation, remedial measures for avoiding slum formation, Slum Clearance and Rehabilitation Use of GIS tools for Town Planning.	05	18%

#### Reference Books :

1. Planning, designing building by Y. S. Sane, Allies Book Stall
2. Sikka, V.B. (2013), A Course in Civil Engineering Drawing, S.K.Kataria & Sons,
3. Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", Pearson Education,
4. Building Drawing by M. G. Shah, C. M. Kale and S. Y. Patki, Tata Mc Graw Hill, New Delhi
5. Architecture- Form, Space and Order by Francis D.K. Ching
6. Building Planning, Designing and scheduling by Gurucharan Singh, Standard Book House, New Delhi
7. National Building Code of India - 2016: Vol.-1 & Vol.-2, Bureau of Indian Standards, New Delhi
8. General Development Control Regulations published by Development Authority
9. Town Planning by S.C. Rangwala, Charotar publishing House, Anand
10. Venugopal (2007), "Engineering Drawing and Graphics + AUTOCAD", New Age International Pvt. Ltd
12. Corresponding set of CAD Software Theory and User Manuals.
13. Guide to RERA with RERA check list by Texman publications.

#### Online Resources :

1. <https://pdfcoffee.com/town-planning-by-rangwalapdf-pdf-free.html>
2. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)







**Practical / Activities :**

(A) Four A1 Size Drawing sheet (Hand drafted) and one Print of 2D & 3D model:

1. Residential Planning: Two storied Building: Plans, elevation, section, lay-out plan, key plan, site plan, area table, schedule of opening. Scale-1:100.
2. Working Drawing: sheet should accommodate min. six types with sectional details of Sheet -1 Planning. (Furniture plan, Drainage lay out, Toilet Detail, Kitchen detail, Electrical plan etc.)
3. Perspective Drawing: Two point perspective of Sheet -1 Planning.
4. Public Building: Ground Floor plan, typical floor plan, elevation, section, lay-out plan, key plan, site plan, area table, schedule of opening.
5. Prepare Building Drawing (2D, 3D model) of Sheet -1 Planning using Software

(B) Assignments:

1. Assignment -1: Principles of Planning & Architecture
2. Assignment -2: Building Bye laws
3. Assignment -3: Town Planning
4. Assignment -4: Different commands of CAD/Software

**List of Software:**

AutoCAD, Revit, SketchUp, Civil 3D, SmartDraw, Draft it, Floorplanner, RoomSketcher, PlanningWiz, Roomle, 3D Max, Tekla

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	-	3	2	1	2	2	-	-	-	-	3	1
CO-2	3	-	2	1	1	1	1	1	-	-	-	-	2	2
CO-3	2	-	2	-	1	-	-	-	-	-	-	-	2	1
CO-4	3	2	2	2	2	2	1	-	-	-	-	-	2	2
CO-5	3	-	-	2	3	1	-	-	-	-	-	-	2	1





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 2<sup>nd</sup>

**Semester :** IV

**Course title :** Civil Engineering Social & Global Impact

**Course code :** FEB140102

**Course type :** Humanities & Social Science including Management courses

**Course credit :** 02

**Pre-requisite :** Global warming, recent major Civil Engineering breakthroughs and innovations

**Rationale :** The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently. The extent of Infrastructure, its requirements for energy and how they are met: past, present and future.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
02	00	00	02	02	70	30	00	00	100

**Course Objective :**

The course is designed to provide a better understanding of the impact which Civil Engineering has on the Society at large and on the global arena. Civil Engineering projects have an impact on the Infrastructure, Energy consumption and generation, Sustainability of the Environment, Aesthetics of the environment, Employment creation, Contribution to the GDP, and on a more perceptible level, the Quality of Life. It is important for the civil engineers to realize the impact which this field has and take appropriate precautions to ensure that the impact is not adverse but beneficial.



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**Course Outcome :**

1. Describe about recent civil engineering breakthroughs & innovates
2. Explain the awareness of various codes & standards governing infrastructure development
3. Describe about environmental metrics & monitoring
4. Explain the sustainability of structure and environment
5. Explain the innovations and methodologies for ensuring sustainability during project development

**Content**

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Introduction:</b> Introduction to Course and Overview; Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Ecosystems in Society and in Nature; the steady erosion in Sustainability; Global warming, its impact and possible causes; Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis</p> <p><b>Importance of Civil Engineering :</b> Understanding the importance of Civil Engineering in shaping and impacting the world; the ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for Civil Engineering</p>	09	35%
II	<p><b>Civil Engineering Infrastructures</b> Infrastructure - Habitats, Megacities, Smart Cities, futuristic visions; Transportation (Roads, Railways &amp; Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling); Awareness of various Codes &amp; Standards governing Infrastructure development; Innovations and methodologies for</p>	04	14%





	ensuring Sustainability.		
III	<b>Environmental Civil Engineering</b> Environment- Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution; Global warming phenomena and Pollution Mitigation measures, Stationary and non stationary; Environmental Metrics & Monitoring; Other Sustainability measures; Innovations and methodologies for ensuring Sustainability.	05	18%
IV	<b>Global Crisis</b> Built environment – Facilities management, Climate control; Energy efficient built environments and LEED ratings, Recycling, Temperature/ Sound control in built environment, Security systems; Intelligent/ Smart Buildings; Aesthetics of built environment, Role of Urban Arts Commissions; Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability	02	07%
V	<b>Social Aspects of Civil Engineering</b> Civil Engineering Projects – Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; New Project Management paradigms & Systems (Ex. Lean Construction), contribution of Civil Engineering to GDP, Contribution to employment (projects, facilities management), Quality of products, Health & Safety aspects for stakeholders; Innovations and methodologies for ensuring Sustainability during Project development.	08	26%

#### Reference Books :

1. Žiga Turk (2014), Global Challenges and the Role of Civil Engineering, Chapter 3 in: Fischinger M. (eds) Performance-Based Seismic Engineering: Vision for an Earthquake Resilient Society. Geotechnical, Geological and Earthquake Engineering, Vol. 32. Springer, Dordrecht
2. Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economic and Working Environment, 120th ASEE Annual Conference and Exposition
3. NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.
4. Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.





5. Ashley R., Stovin V., Moore S., Hurley L., Lewis L., Saul A. (2010). London Tideway Tunnels Programme – Thames Tunnel Project Needs Report – Potential source control and SUDS applications: Land use and retrofit options
6. Ashley R M., Nowell R., Gersonius B., Walker L. (2011). Surface Water Management and Urban Green Infrastructure. Review of Current Knowledge. Foundation for Water Research FR/R0014
7. Blackmore J M., Plant R A J. (2008). Risk and resilience to enhance sustainability with application to urban water systems. J. Water Resources Planning and Management. ASCE. Vol. 134, No. 3, May.
8. Fundamentals of Management: Essential Concepts and Applications, Robbins S.P. and Decenzo David A. - Pearson Education
9. Economics: Principles of Economics, N Gregory Mankiw - Cengage Learning
10. Principles and Practices of Management, L.M.Prasad
11. Principles of Management, Tripathy and Reddy
12. Modern Economic Theory, Dr. K. K. Dewett& M. H. Navalur - S. Chand Publications

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	1	-	-	-	-	1	1	-	-	1	1	1	-	-
CO-2	-	1	-	1	-	-	-	3	-	1	-	1	-	3
CO-3	3	1	1	-	-	1	3	-	-	-	-	-	-	1
CO-4	3	1	2	1	-	2	3	-	-	-	1	1	2	1
CO-5	2	2	2	2	1	2	3	1	2	1	3	1	1	1







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**Faculty of Engineering**

**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 2<sup>nd</sup>

**Semester :** IV

**Course title :** Fluid Mechanics

**Course code :** FEB140103

**Course type :** Professional core courses

**Course credit :** 03

**Pre-requisite :** System of units, Laws of motion, Basic idea of force, Concept of centroid

**Rationale :** To develop a basic understanding about the properties of fluids, their behavior under static and dynamic conditions. To enable the students to apply the basic principles of Fluid Mechanics to solve real life problems

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
02	00	02	04	03	70	30	30	20	150

**Course Objective :**

- To know the properties of fluid and identify their types.
- To calculate hydro static forces and the measurement techniques for pressure.
- To understand the fluid kinematics and dynamics.
- To classify various types of fluid flow.
- To develop the concepts of (a) buoyancy force on immersed and floating body and (b) drag- lift force on the object.



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**Course Outcome :**

After successful completion of the course the students shall be able to:

1. Understand the broad principles of fluid statics, kinematics and dynamics
2. Understand definitions of the basic terms used in fluid mechanics
3. Understand classifications of fluid flow
4. Be able to apply the continuity, momentum and energy principles
5. Be able to apply dimensional analysis

**Content**

Sr.No	Content	Teaching hr	% Weightage
1	<b>Module 1: Properties of Fluids</b> Mass density, specific weight, specific gravity, specific volume, vapour pressure, compressibility, elasticity, surface tension, capillarity; Newton's law of viscosity, classification of fluids, dynamic viscosity, kinematic viscosity, variation of viscosity with temperature; Basic concept applicable to fluid mechanics.	05	16%
2	<b>Module 2: Fluid Statics</b> <b>Measurement of Pressure:</b> Pressure variation in static fluid, PASCAL's law, Units and scale of pressure measurement- Atmospheric pressure, Absolute pressure, Gauge pressure, and Vacuum pressure, Hydrostatic paradox, Piezometer, U- Tube manometer, Single column manometer, U-tube differential manometer, Inverted U-tube differential manometer, micro manometers, Mechanical pressure gauges.	05	16%





3	<p><b>Module 3: Hydrostatic force on plane and curved surface:</b></p> <p>Total pressure and center of pressure, pressure diagram, Total pressure on plane surfaces and curved surfaces depth of center of pressure, Practical applications of Total pressure and Center of pressure.</p> <p><b>Buoyancy and Flotation:</b></p> <p>Buoyant force, Buoyancy and Centre of Buoyancy, Archimedes Principle, Metacentre and Metacentric height, Equilibrium of floating and submerged bodies, Metacentric height evaluation –theoretical and experimental method, Oscillation of floating body</p> <p><b>Fluids in Relative Equilibrium:</b> Static fluid subjected to uniform linear acceleration, Liquid containers subjected to constant horizontal acceleration, Liquid containers subjected to constant vertical acceleration, Liquid containers subjected to constant rotation.</p>	06	18%
4	<p><b>Module 4: Fluid Kinematics</b></p> <p>Fluid flow methods of analysis of fluid motion, Streamlines, Path lines, Streak lines and Stream tubes. Types of fluid Flow- Steady and unsteady flow, Uniform and non-uniform flow, Laminar and turbulent flow, Reynolds number, Reynolds experiment, Rotational and Irrotational flow, Subcritical, critical and Supercritical flow, Compressible and Incompressible flow, One, Two and three dimensional flow, Circulation and vorticity, Velocity potential and stream function, flow net, Source, Sink and Doublet.</p>	08	25%
5	<p><b>Module 5: Fluid Dynamics</b></p> <p>Surface and body forces; Equations of motion - Euler’s equation; Bernoulli’s equation – derivation; Energy Principle; Practical applications of Bernoulli’s equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham’s <math>\pi</math>-Theorem.</p>	08	25%



### Reference Books :

1. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
2. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House
3. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill
4. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.

### List of Suggested Practical's:

Students will have to perform following experiments in laboratory and prepare the laboratory manual. The students will have to solve at least five examples and related theory from each topic as an assignment/tutorial.

1. Measurement of viscosity
2. Study of Pressure Measuring Devices
3. Stability of Floating Body
4. Hydrostatics Force on Flat Surfaces/Curved Surfaces
5. Verification of Bernoulli's Theorem
6. Venturimeter
7. Orifice meter
8. Impacts of jets
9. Flow Visualization -Ideal Flow
10. Length of establishment of flow
11. Velocity distribution in pipes
12. Laminar Flow

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	1	1	1	1	-	-	-	-	-	-	-	3	2
CO-2	3	-	1	-	1	-	-	-	-	-	-	-	2	1
CO-3	3	1	1	1	1	-	-	-	-	-	-	-	1	-
CO-4	3	1	1	1	1	-	-	-	-	-	-	-	3	1
CO-5	3	2	1	1	1	-	-	-	-	-	-	-	1	-



**Gokul Global University, Sidhpur.**



**Faculty of Engineering**

**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 2nd

**Semester :** IV

**Course title :** Materials, Testing and Evaluation **Course code :** FEB140104

**Course type :** Professional core courses **Course credit :** 03

**Pre-requisite :** -Nil

**Rationale :** The selection of materials for engineering purpose is very much crucial activity. In civil engineering any material of construction, the first and for most necessity is to know its properties, suitability, strength and durability. Based on this, one can suggest the most suitable material which may fit the exact requirement of the construction items. In this course, the technology related to some of the important and widely used construction materials has been dealt with. This course will enrich civil engineering technicians in performing their jobs with ease and confidence and will be able to select appropriate material for the given item of work on site.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150

**Course Objective :** The development of a basic understanding about the various construction materials and its application of the basic principles of engineering to solve real-life problems in construction practices is necessary for civil engineers

**Course Outcome :**

1. Identify clay based products for use in building constructions based on its properties.
2. Appreciate the uses of lime and Pozzolana products in building construction.





3. Select appropriate ingredients of proper quality for cement concrete as per required BIS codes.
4. Describe timber and wood products and its uses in building construction.
5. Identify different types of advanced building materials and their uses in construction.

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<b>INTRODUCTION</b> Physical , chemical and engineering properties of building materials, Application of building materials, Alternative materials for the given items in building construction.	04	15%
II	<b>CLAY ,LIME AND POZZOLANA PRODUCTS</b> Classification of clay products, Types of bricks, Manufacturing process of bricks, Test on bricks, Standard requirements and grades of bricks as per BIS, Types of clay tiles and its uses, Sources and classification of Lime, Uses of lime with specific field situation, Types of pozzolanic materials, Advantages of addition of pozzolonic material	08	25%
III	<b>CEMENT CONCRETE</b> Types of cement with their specific use, Grade of cement as per BIS, Engineering properties of cement, Field and laboratory test of cement as per BIS, Methods of storing the cement, Types of aggregate as per BIS, Requirements of aggregate as per BIS, Engineering properties of aggregate, Test on aggregate	10	35%
IV	<b>TIMBER</b> Types of timber, Uses and application of timber, Defects in timber and wood, Seasoning, Wood products with specific uses	02	05%
V	<b>MISCELLANEOUS CONSTRUCTION MATERIALS</b> Plastics and PVC, Ceramic products, Paints and Varnish, Materials for damp proofing , water proofing, Materials for anti termite treatment, Glass and fiber, Steel and iron materials, Materials used for false ceiling, Asbestos, Concrete blocks	06	20%

### Reference Books :

1. Engineering Materials by Dr. Janardan Jha, Khanna
2. Materials of Construction by A K Roy Chaudhary,
3. Building materials by S. K. Duggal, New Age International
4. Engineering Materials by Vazirani and Chandola,







5. Engineering Materials by S C Rangwala, Charotar
6. Construction Materials by D.N. Ghose, TATA Mc Graw Hill
7. Civil Engineering materials by TTTI ,Chandigarh, TTTI

**Online Resources :**

1. <http://elearning.vtu.ac.in/>
2. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

**Practical / Activities :**

1. Various test on Cement
2. Various test on Fine & Course Aggregate
3. Various test on Bricks

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	-	1	1	2	2	2	-	1	-	1	-	2	2
CO-2	3	2	2	1	2	-	-	1	-	-	2	-		
CO-3	3	1	3	2	2	1	1	-	-	1	-	2	2	3
CO-4	2	-	1	1	-	-	2	-	1	-	-	1	-	-
CO-5	2	2	2	3	2	-	1	-	1	-	3	-	1	1







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**Gokul Global University, Sidhpur.**



**Faculty of Engineering**

**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 2<sup>nd</sup>

**Semester** : IV

**Course title** : Structural Analysis-I

**Course code** : FEB140105

**Course type** : Professional Core Course

**Course credit** : 03

**Pre-requisite** : Mechanics of Solids

**Rationale** : This subject is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering

**Teaching Examination Scheme** :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
02	00	02	04	03	70	30	30	20	150

**Course Objective** :

1. To impart the principles of elastic structural analysis and behaviour of indeterminate structures.
2. To impart knowledge about various methods involved in the analysis of indeterminate structures.
3. To apply these methods for analyzing the indeterminate structures to evaluate the response of structures
4. To enable the student get a feeling of how real-life structures behave
5. To make the student familiar with latest computational techniques and software used for structural analysis.



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**Course Outcome :**

After studying this subject student will be able to:

1. Apply principles of statics to determine reactions & internal forces in statically determinate structures.
2. Determine displacements of statically determinate structures.
3. Determine stresses due to axial & eccentric loading.
4. Determine buckling load for columns & struts with different end conditions.
5. Determine fixed-end actions for various types of loads.

**Content**

Unit	Description in detail	Total Hrs	Weightage
I	<b>Fundamentals of Statically Determinate Structures:</b> Types of statically determinate & indeterminate structures, static and kinematic indeterminacy, stability of structures, principle of superposition, Maxwell's reciprocal theorems. Computation of internal forces in statically determinate structures such as plane truss, plane frame, grids.	05	15%
II	<b>Displacement of Determinate Beams and Plane Truss:</b> Differential equation of elastic curve, relation between moment, slope and deflection, Macaulay's method, Moment Area Method, Conjugate Beam Method applied to beams. Joint displacement of determinate plane truss using unit load method.	07	25%
III	<b>Direct and Bending stresses:</b> Members subjected to eccentric loads, middle third rule, kernel of section, chimney subjected to wind pressure, retaining walls, dams subjected to hydraulic pressure <b>Columns and Struts:</b> Buckling of columns, different end conditions, effective length, least radius of gyration, Euler's and Rankine's formulae, columns with initial curvature, eccentrically loaded columns, columns with lateral loading.	09	34%
IV	<b>Arches, Cables and Suspension Bridges:</b> Calculation internal forces in three hinge arches with circular and parabolic shapes subjected to various types of loading. Forces and end actions in cables due to various types of loading. Unstiffened three hinged parabolic and centenary type suspension bridge.	07	25%





V	<b>Fixed Beams &amp; Consistent Deformation Method:</b> Computation of fixed-end actions for various types of loads and secondary Effects using basic principles, beams of varying moment of inertia. Analysis of propped cantilever beams & beams of varying moment of inertia using Consistent Deformation Method	<b>This portion to be covered in laboratory</b>	<b>0%</b>
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### Reference Books :

1. Junarkar S.B. & Shah H.J.; Mechanics of Structures Vol-I; Charotar publishing house, Anand
2. Wang C. K.; Intermediate Structural Analysis; Tata McGraw Hill book Company, New Delhi
3. Popov E.P.; Engineering Mechanics of Solids; Prentice Hall of India, New Delhi
4. Ryder G.H.; Strength of Materials; Mcmillan
5. Gere & Timoshenko; Mechanics of Materials; CBS Publishers & Distributors, Delhi
6. Hibbler R C; Mechanics of Materials; Pearson Education
7. Hibbler R C; Structural Analysis; Pearson Education

### Online Resources :

<https://easyengineering.net/category/structural-analysis-books-collection-nw/>  
[www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

### Practical / Activities :

The student will have to solve at least five examples and related theory from each topic as an assignment/tutorial.

1. Do study with various problem of principles of statics to determine reactions & internal forces in statically determinate structures.
2. Find out displacements of statically determinate structure problem.
3. Determine stresses due to axial & eccentric loading.
4. Do study the buckling load for columns & struts.
5. Calculation internal forces in three hinge arches with circular and parabolic shapes subjected to various types of loading & Different condition of structure.
6. Calculate fixed-end actions for various type of loads.





Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	3	1	-	-	-	2	-	-	-	-	2	1
CO-2	3	2	3	1	-	-	-	1	-	-	-	-	2	1
CO-3	3	3	2	2	-	-	-	1	-	-	-	-	3	2
CO-4	3	3	3	1	-	-	-	1	-	-	-	-	2	2
CO-5	2	3	3	1	-	-	-	1	-	-	-	-	2	1





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**Gokul Global University, Sidhpur.**



**Faculty of Engineering**

**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 2<sup>nd</sup>

**Semester :** IV

**Course title :** Surveying

**Course code :** FEB140106

**Course type :** Professional Core Course

**Course credit :** 03

**Pre-requisite :** Student shall have studied basic Elements of Civil Engineering

**Rationale :** To develop concepts of various types of land surveying and prepare and interpret maps and drawing.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
02	00	02	04	03	70	30	30	20	150

**Course Objective :**

- To collect field data so a map or plan can be prepared based on the calculations of the field parameters before an engineering operation is actually executed to begin a construction project.
- To determine the relative position of any objects or points of the earth.
- To determine the distance and angle between different objects.
- To prepare a map or plan to represent an area on a horizontal plan.



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### Course Outcome :

The course will enable the students to:

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
2. Translate the knowledge gained for the implementation of Civil infrastructure facilities
3. Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing
4. Relate the knowledge on Surveying to the new frontiers of science like Global Positioning System, Photogrammetry and Remote Sensing
5. To understand practical knowledge of process of theodolite and tacheometry survey..

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<b>Plane Table Survey:</b> Introduction, principle, instruments, setting up the plane table, methods of plane tabling, advantages, sources of Errors	04	15%
II	<b>Theodolite Traversing:</b> Introduction, definitions, the Vernier transit theodolite, temporary and permanent adjustment of theodolite, measuring horizontal and vertical angles, methods of traversing, closing error, computation of latitudes and departure, check in closed and open traverse, balancing of traverse, Gale's table <b>Trigonometric levelling:</b> Indirect levelling, heights and distances, methods, direct levelling on steep ground.	06	25%







III	<p><b>Curves:</b> Elements of simple and compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves</p> <p><b>Areas and Volumes:</b> Introduction, computation of area, computation of area from field notes and plotted plans, boundary area, area of traverse, Use of Plannimeter, computations of volumes, Volume from cross sections, Trapezoidal and Prismoidal formulae, Prismoidal correction, Curvature correction, capacity of reservoir, volume from borrow pits</p>	08	30%
IV	<p><b>Tachometric Surveying:</b> Introduction, purpose, principle, instruments, methods of tacheometry, stadia constants, analytic lens, Sub tense bar, field work in tacheometry, reduction of readings, errors and precisions</p> <p><b>Geodetic Surveying:</b> Introduction, triangulation, principle and uses of triangulation, triangulation systems and its classification, well conditioned triangles, strength of figure, selection of triangulation stations and their inter-visibility, stations marks, signals, towers and scaffolds, base line, site selection and base line measurement, tape corrections, the base net, extension of base line, satellite station and reduction to centre</p>	08	25%
V	<p><b>Theory of Errors :</b> Introduction, types of errors, definitions, laws of accidental errors, laws of weights, theory of least squares, rules for giving weights and distribution of errors to the field observations, determination of the most probable values of quantities.</p> <p><b>Modern Surveying Instruments:</b> Introduction, electromagnetic spectrum, electromagnetic distance measurement, types of EDM instruments, electronic digital theodolites, total station, digital levels, scanners for topographical survey, global positioning system.</p>	02	05%

**Reference Books :**

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
2. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010





4. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
5. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.
6. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
7. Surveying Vol.I, II and III by Dr. B.C. Punamia
8. Surveying and Levelling Vol. I and II by T.P Kanetkar and S.V Kulkarni
9. Surveying Vol. I and II by S. K. Duggal

**Online Resources :**

3. <https://www.pdfdrive.com/engineering-surveying-books.html>
4. [https://easyengineering.net/engineering-surveying-books-collection\\_18/](https://easyengineering.net/engineering-surveying-books-collection_18/)
5. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

**Practical / Activities :**

1. Plane table traversing by intersection and radiation methods
2. Two point problem and three point problem
3. Theodolite traversing and plotting of traverse by applying corrections in Gale's traverse table
4. Total Station for determination of reduced levels and Horizontal distances of various points in the field.
5. Interpretation of R S maps using image browser
6. Local survey using GPS
7. Tacheometry Survey
8. Examples on triangulations adjustments

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	1	-	3	1	-	2	2	1	1	-	2	2
CO-2	3	3	1	-	2	1	-	2	1	1	1	-	2	2
CO-3	3	3	2	1	3	1	-	2	1	-	-	-	1	1
CO-4	3	2	3	-	2	1	-	1	2	-	1	-	2	2
CO-5	3	3	3	-	2	2	-	1	2	1	-	-	3	2





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 3<sup>rd</sup>

**Semester** : V

**Course title** : Engineering Economics & Management

**Course code** : FEB150001

**Course type** : Humanities & Social science including management courses

**Course credit** : 03

**Pre-requisite** : Basic course of Economics & Management

**Rationale** : NIL

**Teaching Examination Scheme** :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	0	3	3	70	30	00	00	100

**Course Objective** :

- The primary objective of this course is to provide students with a systematic framework for evaluating the economic aspects of competing alternatives to engineering design solutions

**Course Outcome** :

After learning the course the students should be able to:

- To impart knowledge, with respect to concepts, principles and practical applications of economics, which govern the functioning of a firm/organization under different market conditions.



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2. To help the students to understand the fundamental concepts and principles of management; the basic roles, skills, functions of management, various organizational structures and basic knowledge of marketing.
3. To help the students to understand the principles of management and basic knowledge of marketing
4. To understanding of the fundamental concepts of Managerial economics and demand.
5. The ability to apply knowledge to evaluate future demand and theory of production.

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Introduction:</b> Definitions, Nature, Scope, Difference between Microeconomics &amp; Macroeconomics Theory of Demand &amp; Supply; meaning, determinants, law of demand, law of supply, equilibrium between demand &amp; supply Elasticity; elasticity of demand, price elasticity, income elasticity, cross elasticity</p> <p><b>Theory of production:</b> Theory of production; production function, meaning, factors of production (meaning &amp; characteristics of Land, Labour, capital &amp; entrepreneur), Law of variable proportions &amp; law of returns to scale Cost; Meaning, Short run &amp; Long run cost, fixed cost, Variable cost, Total cost, Average cost, Marginal cost, Opportunity cost. Break even analysis; meaning, explanation, numerical</p>	08	20%
II	<p><b>Markets and National Income :</b> Markets; Meaning, types of markets &amp; their characteristics (Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly) National Income; Meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP, NDP, Personal income, disposal income</p> <p><b>Basic Economic Problems :</b> Poverty - meaning, absolute &amp; relative poverty, causes, measures to reduce it Unemployment: meaning, types, causes, remedies Inflation; meaning, types, causes, measures to control.</p>	09	20%



III	<p><b>Money and Banking :</b> Money; meaning, functions, types, Monetary policy- meaning, objectives, tools, Fiscal policy-meaning, objectives, tools Banking; meaning, types, functions, Central Bank- RBI; its functions, concepts; CRR, bank rate, repo rate, reverse repo rate, SLR.</p> <p><b>Introduction to Management :</b> Definitions, Nature, scope Management &amp; administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy theory of needs</p>	<b>08</b>	<b>21%</b>
IV	<p><b>Functions of Management :</b> Functions of Management; Planning, Organizing, Staffing, Directing, Controlling (Meaning, nature and importance) Organizational Structures; meaning, principles of organization, types-formal and Informal, line, line &amp; staff, matrix, hybrid (explanation with merits and demerits), Span of control, departmentalization.</p> <p><b>Marketing and Finance Management :</b> Meaning, Marketing Mix, concepts of marketing, demand forecasting and methods, market segmentation Finance Management; Introduction, Meaning, scope, sources, functional departmentalization.</p>	<b>10</b>	<b>22%</b>
V	<p><b>Production and Human Resource Management:</b> Production Management; Introduction, definitions, objectives, functions, plant layout-types &amp; factors affecting it, Human Resource Management; Introduction definitions, objectives of manpower planning, process, sources of recruitment, process of selection.</p> <p><b>Corporate Social Responsibility and Business Ethics :</b> Corporate Social Responsibility; meaning, importance Business Ethics; meaning, Importance</p>	<b>07</b>	<b>17%</b>

**Reference Books :**

1. Engineering Economics, R.Paneerselvam - PHI publication
2. Fundamentals of Management: Essential Concepts and Applications, Robbins S.P. and Decenzo David A. - Pearson Education
3. Economics: Principles of Economics, N Gregory Mankiw - Cengage Learning
4. Principles of Management, Tripathy and Reddy
5. Modern Economic Theory, Dr. K. K. Dewett & M. H. Navalur - S. Chand Publications







**Online Resources :**

<https://archive.nptel.ac.in/courses/112/107/112107209/>  
<https://www.hzu.edu.in/engineering/engineering%20economy.pdf>  
<https://inzeko.ktu.lt/index.php/EE>

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	3	-	-	1	3	-	-	-	-	1	-	-
CO-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	-	2	3	-	-	1	-	-	-	-	-	-	-	-
CO-4	3	-	-	-	-	-	2	2	-	-	1	1	-	-
CO-5	-	2	2	-	-	1	-	-	-	-	-	-	-	-
CO-6	3	-	-	-	-	-	1	1	-	-	2	-	-	-







## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program :** Bachelor of Civil Engineering

**Subject / Branch :** Civil

**Year :** 3<sup>rd</sup>

**Semester:** V

**Course title :** Hydrology And Water  
Resources Engineering

**Course code :** FEB150101

**Course type :** Professional Core Course

**Course credit :** 04

**Pre-requisite :** Knowledge of hydrological cycle and its component, ground water hydrology, Basic ideas about floods, drought, hydropower plants and reservoir

**Rationale :**

1. To develop basic understanding about precipitation, infiltration, Evapo-transpiration, hydrograph, capacity of reservoir
2. To enable the students for estimation of runoff, infiltration, evaporation, floods and reservoir capacity
3. To create understanding about features of various types of dam

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
03	01	00	04	04	70	30	30	20	150



### Course Objective :

1. To prepare the students for a successful career as hydrologist and water resources engineers
2. To develop the ability among students to synthesis data and technical concepts for application in hydrology and water resources engineering
3. To provide students an opportunity to work as a part of interdisciplinary team
4. To provide students with a sound foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, analyze, solve engineering problems and to prepare them for their career.
5. To promote student awareness of the life-long learning and to introduce them professional ethics and codes of professional practice in water resource engineering

### Course Outcome :

At the end of the course, students must be in a position to:

1. Understand the interaction among various processes in the hydrologic cycle
2. Apply the application of fluid mechanics and use of computers in solving a host of problems in hydraulic engineering
3. Study types and classes of hydrologic simulation models and design procedures for safeand effective passage of flood flows for design of hydraulic structures
4. Understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions
5. Understand application of systems concept, advanced optimization techniques to cover the socio-technical aspects in the field of water resources
6. Apply the principles and applications of remote sensing, GPS and GIS in the context to hydrological extreme flood and drought events in water resources engineering

### Content

Unit	Description in detail	Credit	Weightage
I	<p><b>Introduction-</b> hydrologic cycle, water-budget equation, history of hydrology, World water balance, applications in engineering, sources of data.</p> <p><b>Precipitation-</b> forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, depth area- duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.</p> <p><b>Abstractions from precipitation-</b> evaporation process, evaporimeters, analytical methods of evaporation estimation,</p>	07	20 %





	reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.		
II	<b>Runoff-</b> runoff volume, SCS-CN method of estimating runoff volume, flow duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows. <b>Ground water and well hydrology-</b> forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests	08	25 %
III	<b>Water withdrawals and uses-</b> water for energy production, water for agriculture, water for hydroelectric generation; flood control. Analysis of surface water supply, Water requirement of crops- Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation	7	20 %
IV	<b>Distribution systems</b> -canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Kennedy's and Lacey's theory of regime channels. Canal outlets: non-modular, semi-modular and modular outlets. Water logging: causes, effects and remedial measures. Lining of canals, types of lining. Drainage of irrigated lands: necessity, methods.	4	10 %
V	<b>Dams and spillways-</b> embankment dams: classification, design considerations, estimation and control of seepage, slope protection. Gravity dams: forces on gravity dams, causes of failure, stress analysis, elementary and practical profile. Arch and buttress dams. Spillways: components of spillways, types of gates for spillway crests; Reservoirs- Types, capacity of reservoirs, yield of reservoir, reservoir regulation, sedimentation, economic height of dam, selection of suitable site.	10	25 %

**Reference Books :**

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.





2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
3. K Subramanya, Water Resources Engineering through Objective Questions, Tata Mc-Graw Hill.
4. G L Asawa, Irrigation Engineering, Wiley Eastern
5. L W Mays, Water Resources Engineering, Wiley.
6. J D Zimmerman, Irrigation, John Wiley & Sons
7. C S P Ojha, R Berndtsson and P Bhunya, Engineering Hydrology, Oxford.
- 8.

**Online Resources :**

<http://en.wikipedia.org/wiki/Hydrology>

**Practical / Activities :**

1. To determine rate of infiltration and infiltration capacity using double ring infiltrometer.
2. Measurement of rainfall
3. Estimation of flood using unit hydrograph
4. Computation of rate of infiltration using infiltrometer
5. Computation of live and dead storage capacity of reservoir
6. Flood routing of reservoir and channel
7. Calculation of dependable flow.
8. Determination of capacity of well.
9. Calculation of power of a hydro-power plant

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	-	1	1	-	-	2	-	-	-	-	-	1	-
CO-2	2	2	1	1	1	-	-	-	-	-	-	-	2	1
CO-3	3	2	3	2	3	1	1	-	-	-	-	-	1	2
CO-4	2	3	1	1	-	1	2	-	-	-	-	-	2	-
CO-5	2	3	2	1	2	2	1	-	-	-	-	-	1	2
CO-6	2	2	1	3	3	1	2	-	-	-	-	-	2	2





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program :** Bachelor of Civil Engineering

**Subject / Branch :** Civil

**Year :** 3<sup>rd</sup>

**Semester:** 5<sup>th</sup>

**Course title :** Soil Engineering – I

**Course code :** FEB150102

**Course type :** Professional Core Course

**Course credit :** 04

**Pre-requisite :** Basic Knowledge of Soil, Strength of Soil & Mechanics, Basic Geology

**Rationale :** A Civil Engineer Has to Be Conversant with Soil Engineering and Their Testing Procedure, Skill of Preparing Soil Report.

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
03	00	02	05	04	70	30	30	20	150

#### Course Objective :

- The objective of this course is to introduce students with the essential concepts of the physical properties of soils as a civil engineering material and the fundamental principles of soil mechanics.

#### Course Outcome :

After learning the course, the students should be able to:

- Classify the soil and will be able to understand its behaviors and will be able to compute/estimate index parameters.







2. Interpret soil behaviors through learning soil compaction, consolidation, and analyses various theories and calculate parameters needed in design.
3. Compute earth pressure, stress distributions and FOS for slopes using various graphical and analytical tools for various engineering projects/site.
4. Differentiate, compare, formulate, and evaluate soil parameters through performing various tests as per site conditions or project needs ethically and professionally.
5. Suggest suitable type of foundation as per soil type, estimate bearing capacity and demonstrate its socio-economic feasibility.

### Content

Unit	Description in detail	Credit	Weightage
I	<p><b>Introduction</b></p> <p>Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Comparison and difference between soil and rock. Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio, and porosity. Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity, etc. Relationship between volume weight, voids ratio-moisture content, unit weight- percent air voids, saturation-moisture content, moisture content- specific gravity etc. Determination of various parameters such as: Moisture content by oven dry method, pycnometer, sand bath method, torsional balance method, nuclear method, alcohol method and sensors. Specific gravity by density bottle method, pycnometer method, measuring flask method. Unit weight by water displacement method, submerged weight method, core-cutter method, sand-replacement method.</p> <p><b>Plasticity Characteristics of Soil</b></p> <p>Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow &amp; toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system. Identification: field identification of soils, general characteristics of soil in different groups.</p>	12	30
II	<b>Permeability of Soil</b>	08	25







	Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method. Field method: pumping- in test, pumping-out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil. Seepage Analysis-Introduction, stream and potential functions, characteristics of flow nets, graphical method to plot flow nets. <b>Effective Stress Principle</b> Introduction, effective stress principle, nature of effective stress, effect of water table. Fluctuations of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quick sand condition.		
III	<b>Compaction of Soil</b> Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in field, compaction specifications and field control.	05	15
IV	<b>Consolidation of Soil</b> Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation.	05	15
V	<b>Shear Strength of Soil</b> Mohr circle and its characteristics, principal planes, relation between major and minor principal stresses, Mohr-Coulomb theory, types of shear tests: direct shear test, merits of direct shear test, triaxial compression tests, test behavior of UU, CU and CD tests, pore-pressure measurement, computation of effective shear strength parameters. Unconfined compression test, vane shear test.	06	15

**Reference Books :**

1. Soil Mechanics by Craig R.F., Chapman & Hall
2. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
3. An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ
4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning
5. Principles of Foundation Engineering, by Braja M. Das, Cengage Learning
6. Essentials of Soil Mechanics and Foundations: Basic Geotechnics by David F. McCarthy
7. Soil Mechanics in Engineering Practice by Karl Terzaghi, Ralph B. Peck, and GholamrezaMesri.



8. Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering (Civil and Environmental Engineering) by V.N.S. Murthy

**Online Resources:**

- [https://csmrs.gov.in/Library/43\\_3\\_Library.aspx](https://csmrs.gov.in/Library/43_3_Library.aspx)

**Practical / Activities:**

1. Field Density using Core Cutter method.
2. Field Density using Sand replacement method.
3. Natural moisture content using Oven Drying method.
4. Field identification of Fine-Grained soils.
5. Specific gravity of Soils.
6. Grain size distribution by Sieve Analysis.
7. Grain size distribution by Hydrometer Analysis.
8. Consistency limits by Liquid limit.
9. Consistency limits by Plastic limit.
10. Consistency limits by Shrinkage limit.
11. Permeability test using Constant-head test method.
12. Permeability test using Falling-head method.
13. Compaction test: Standard Proctor test.
14. Compaction test: Modified Proctor test.
15. Relative density.
16. Consolidation Test

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	2	2	2	-	-	1	-	-	-	-	-	1	3
CO-2	3	3	3	2	1	1	1	2	1	-	-	-	1	2
CO-3	3	3	3	2	2	-	1	-	-	-	3	-	2	2
CO-4	2	2	3	2	1	1	-	3	1	-	2	-	2	1
CO-5	3	2	1	1	1	3	2	1	1	-	2	-	2	1



**GOKUL  
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(Recognized by UGC under Section 22 & 2(f) of 1956)  
(Gujarat Private State University Act 4 of 2018)



**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** :Bachelor of Engineering

**Subject / Branch** :Civil Engineering

**Year** :3<sup>nd</sup>

**Semester** :5th

**Course title** : Structural Analysis-II

**Course code** : FEB150103

**Course type** : Professional Core Course

**Course credit** : 04

**Pre-requisite** : Mechanics of Solids, Structural Analysis-I

**Rationale** :This subject is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering

**Teaching Examination Scheme:**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
03	00	02	05	04	70	30	30	20	150

**Course Objective :**

To provide students with an understanding of the methods for the analysis of indeterminate structures like the Force Method and Displacement Method.

To develop the student's ability, to analyze indeterminate structures like beams, frames, and trusses using various classical and matrix methods.

To introduce students to the concept of matrix analysis and its application to structural analysis problems.

**Course Outcome :**

After learning the course the students should be able to:

1. State various methods used to analyses determinate and indeterminate structures.



**Faculty of Engineering**

**Hansaba College of Engineering & Technology**



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2. Apply equilibrium and compatibility equations to determine response of statically
3. determinate and indeterminate structures.
4. Select suitable method to find displacements and internal forces of statically
5. indeterminate structures.
6. Prepare influence line diagrams for determinate and indeterminate structures to
7. determine reactions and internal forces when subjected to moving loads.

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<b>Energy Principles:</b> Castigliano's theorems , computation of displacements of statically determinate beams, trusses and frames by unit load method, analysis of indeterminate structures – beams, trusses, frames	05	10%
II	<b>Slope Deflection Method</b> Analysis of continuous beams for various loading including settlement/ rotation of support, analysis of simple portal frame with sway	06	20%
III	<b>Moment Distribution Method</b> Analysis of continuous beams & frames including sway, use of symmetry of structure up to two storeyed / two bay frames.	06	15%
IV	<b>Influence line diagrams</b> ILD for statically determinate beams- I.L.D of support reaction, shear force and moment bending moment for beams subjected to u.d.l and several point loads, criteria for maximum effects, ILD for statically determinate trusses, forces in members for u.d.l and point loads ILD for statically indeterminate beams: Muller-Breslau's principle, steps for obtaining I.L for reaction and internal forces in propped cantilever and continuous beams, qualitative I.L for rigid jointed structures having higher degree of statically indeterminacy.	08	20%
V	<b>Matrix Methods:</b> Types of skeletal structures, Internal forces and deformations. Introduction and applications of stiffness method to analyze beams, Trusses and plane frames by system approach Introduction and applications of Flexibility method to analyze beams, Trusses and plane frames by system approach	16	35%
	<b>Plastic Analysis</b> Concept, Assumptions, Shape factor for different cross section, Collapse load, Load factor, Plastic modulus of section, Plastic moment of resistance, Computation of collapse load for fixed beam, Continuous		





	beam and plane frame subjected to various load cases		
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**Reference Books :**

1. Junarkar S.B. & Shah H.J.; Mechanics of Structures Vol-I; Charotar publishing house, Anand
2. Wang C. K.; Intermediate Structural Analysis; Tata McGraw Hill book Company, New Delhi
3. Popov E.P.; Engineering Mechanics of Solids; Prentice Hall of India, New Delhi
4. Ryder G.H.; Strength of Materials; Mcmillan
5. Gere & Timoshenko; Mechanics of Materials; CBS Publishers & Distributors, Delhi
6. Hibbler R C; Mechanics of Materials; Pearson Education
7. Hibbler R C; Structural Analysis; Pearson Education

**Online Resources :**

- <https://easyengineering.net/category/structural-analysis-books-collection-nw/>
- [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)
- [://procivilengineer.com/structural-analysis-books/](http://procivilengineer.com/structural-analysis-books/)

**List of Tutorials:**

1. Prepare working model to understand behavior of portal frame/s with different support condition and different types of joints.
2. Verification of Muller- Breslau’s Principle 3.
3. Prepare spread sheet for analyzing structures using matrix method with help of MS-Excel.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	-	1	-	-	-	-	1	2	-	1	2	-
CO-2	3	3	-	1	2	-	-	-	-	-	-	-	1	-
CO-3	3	2	-	2	-	-	-	-	-	-	-	1	-	-
CO-4	3	2	-	1	-	-	-	1	-	-	-	-	-	-
CO-5	2	-	-	2	2	-	-	-	1	2	-	1	-	-







**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 3<sup>rd</sup>

**Semester :** V

**Course title :** Transportation Engineering I

**Course code :** FEB150104

**Course type :** Professional Core Course

**Course credit :** 04

**Pre-requisite :** Basic knowledge of material testing like soil and bitumen.

**Rationale :** The Civil engineer must be aware of the environmental effects of pollutants and should be able to understand the pollutants, their characteristics and manage systems to mitigate them. The water is basic requirement for humans and should be available in pure and potable form to keep the community away from waterborne diseases and treatment of wastewater is absolutely needed to protect the health of people.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	2	5	4	70	30	30	20	150

**Course Objective :** • To understand the design of road network which is safe, economic and time saving for passengers and goods movements. • To impart knowledge to the civil engineering students on highway planning, geometric design, traffic studies. • To make students understand about various components of pavement structure and maintenance. • To make students able to perform various test related to highway materials.

**Course Outcome :**

After learning the course the students should be able to:

1. Know about highway planning and its classification





2. Carryout geometric design of highway
3. Carryout laboratory tests on aggregates and bituminous materials
4. Carryout preliminary design of flexible and rigid pavement
5. Know about pavement failures, its maintenance, importance of drainage, hill roads and their challenges
6. Carryout survey of classified traffic volume count and spot speed study on highway
7. Know about importance and working of different traffic control devices

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<b>Highway development and planning:-</b> Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation	05	10%
II	<b>Geometric design of highways:-</b> Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems.	08	15%
III	<b>Design of pavements:-</b> Introduction; Bituminous material and tests, flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements- components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems	15	30%
IV	<b>Hill roads:</b> – alignment, construction, drainage and maintenance. Roadside development – arboriculture, street lighting. Highway administration, economics and finance, road safety audit. Pavement failures, Maintenance, Surface and subsurface drainage, <b>Traffic engineering &amp; control:-</b> Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems	15	30%
V	<b>Tunnel Engineering</b> Necessity/advantage of a tunnel, Classification of Tunnels, Size and shape of a tunnel, Alignment of a Tunnel, Portals and Shafts, Methods of Tunneling in Hard Rock and Soft ground.	08	15%





### Reference Books :

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th  
a. Edition, Nem Chand & Bros, 2017
2. Kadiyali, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
3. Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,
4. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
5. Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
6. Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009

### Online Resources :

<http://elearning.vtu.ac.in/>

[www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

### List of Suggested Practical:

1. California Bearing Ratio (CBR) Test.
2. Aggregate Crushing Test
3. Aggregate Impact Test.
4. Flakiness Index and Elongation Index Test for Aggregate.
5. Los Angeles Abrasion Test / Deval Abrasion Test
6. Marshall Stability Test on Bitumen mix.
7. Specific Gravity and Water Absorption Test for Aggregate.
8. Penetration Test for Bitumen.
9. Softening Point Test for Bitumen.
10. Ductility Test for Bitumen.
11. Flash and Fire Point Test for Bitumen.
12. Specific Gravity Test for Bitumen
13. Viscosity Test for Bitumen.





Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	2	1	1	2	2	3	2	-	-	-	2	1
CO-2	3	2	2	1	1	-	-	-	-	-	-	-	2	1
CO-3	3	2	2	1	1	-	-	-	-	-	-	-	1	3
CO-4	2	3	2	1	1	-	3	-	-	-	-	-	2	1
CO-5	2	2	2	1	1	-	-	-	-	-	-	-	2	2
CO-6	3	3	3	2	1	-	-	-	-	3	3	-	2	1
CO-7	-	2	2	3	1	2	-	1	-	2	-	-	1	1





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**Gokul Global University, Sidhpur**

**Faculty of Engineering**



**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** III

**Semester :** V

**Course title :** Air Pollution & Control

**Course code :** FEB150105

**Course type :** Elective course

**Course credit :** 03

**Pre-requisite :** Basics of Air Pollution Control

**Rationale :** The air pollution levels in some of our cities have reached to such a level that it is causing health related problems and very poor visibility in winter months resulting in traffic accidents. It is therefore very important to monitor and control air pollution. The course will provide

a detailed knowledge of air quality management with an emphasis on the sources of air pollution, including the effects on humankind, plants and animals. In depth awareness of central, state, and local regulatory requirements in respect of air pollution laws and regulations will be provided. Principles of air pollution prevention and control, equipment and technology used for the purpose will be dealt with description of control of specific gaseous emissions. This course is therefore a key course for environment engineers.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150



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### Course Objective:

- To provide general understanding of quality of air and impact on local and global effects of air pollution on human, materials, properties and vegetation.
- To study the fate and transport of air pollutants and its measurement techniques.
- To discuss the various types of air pollution control equipment and their design principles and limitation.

### Course Outcome :

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes:

1. Identify sources, causes and effects of air pollution.
2. Analyze the environmental effects of air pollution on humankind, plant and animal kingdoms.
3. Identify the meteorological components
4. Take basic actions to minimize air pollution, prevention and control
5. Maintain scrubbing system to control specific gaseous emission.
6. Follow the laws and regulations of air pollution prevention and control at the local, state and country level.

### Content:

Unit	Description in detail	Total Hrs	% Weightage
I	<b>Air Pollutants:</b> Air pollution is an environmental problem, Classification of air pollutants: Natural contaminants, Particulate, Gases and vapor, Primary and secondary air pollutants, Sources of Air pollution: Stationary sources, Mobile sources, Effects of air pollution on: human health, animals, plants, Properties, Society.	05	20
II	<b>Meteorology:</b> Meteorological factors influencing air pollution: Dispersion, Temperature Lapse Rates and Stability, Measurement of wind speed, direction and temperature, Effect of meteorological parameter on Plume behaviour, Reglement chart for plume behaviour, Dispersion of air pollutants, Determination of Stack height based on these parameters, Stability classes.	05	20
III	<b>Air Pollution Sampling and Measurements:</b> Sampling methods, Duration of Sampling, Ambient Sampling and its location: Collection of Gaseous Air Pollution, Collection of Particulate Matter,	05	20





	Stack Sampling and selection of sampling location.		
IV	<b>Air Pollution Control Methods and Equipment:</b> Types of collection methods, Particulate Emissions Control Equipment's: Gravity settling, cyclones, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection of Collectors, Control of Gaseous Emissions: Absorption by Liquids, Adsorption by Solids, Air pollution control laws/acts at different central, state and local levels and by regulatory bodies.	8	25
V	<b>Control of Specific Gaseous Emissions:</b> Control of SO <sub>2</sub> : Chemistry of SO <sub>2</sub> , Lime and Limestone Scrubbing, Wet lime scrubbing, Single Alkali scrubbing and Double Alkali scrubbing, Dry process, Control of NO <sub>2</sub> : Combustion control methods	5	15

### Reference Books:

- Rao, M. Nand Rao, H.N., "Air Pollution and Control" Tata McGraw Hill, New Delhi 1989.
- H.C. Parkins, "Air Pollution", McGraw-Hill Pub.
- Martin Crawford, "Air Pollution Control Theory", TMH Publication.
- Wark and Warner, "Air Pollution", Addison-Wesley Publications 1988.
- IS: 5182, Methods for measurement of air pollution (Part-I, II, IV, V, X)

### Suggested Practical/Exercises:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

- Solve given problems based on classification of air pollution
- Solve given problems based on sources of pollution and its effect
- Solve given problems based on meteorology
- Solve given problems based on air pollution sampling and measurements
- Perform practical based on air pollution sampling and measurements
- Solve given problems based on air pollution control methods and equipment
- Solve given problems based on control of specific gaseous pollutants
- Present seminar on a given topic and submit report (Students may be given topics in the group of five)

### Online Recourses:

- <http://nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/> Environmental Air Pollution





### Suggested Students Activities (Home/Field Assignment)

- Make a report after gathering information about the values of ambient air pollution in your town or city and compare them with that of other cities.
- Prepare sketches for: Different types of Plume behaviour.
- Industrial visit for stack and ambient air quality monitoring and for operation of scrubbing system with requisite permission from authorities.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	-	1	-	-	-	1	3	-	-	-	-	1	-	-
CO-2	-	1	1	1	-	1	3	-	-	-	-	1	1	1
CO-3	1	1	-	-	-	-	3	-	-	-	-	1	-	-
CO-4	-	1	1	1	-	-	2	-	-	-	1	1	-	-
CO-5	1	2	1	2	2	1	2	-	-	-	-	-	-	-
CO-6	-	-	-	2	-	1	3	3	-	-	1	1	-	1





**Gokul Global University, Sidhpur.**



**Faculty of Engineering**

**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 3<sup>rd</sup>

**Semester :** V

**Course title :** Infrastructure Planning

**Course code :** FEB150106

**Course type :** Professional Elective Course

**Course credit :** 03

**Pre-requisite :** Elements of infrastructure, management, associate risks and its mitigation.

**Rationale :** A Civil Engineer has to be conversant with building and town planning and their development controls, skill of preparing drawings of various types like, orthographic, perspective, working drawings etc. using software application.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150

**Course Objective:** To study the necessity of infrastructure & its management, finance management Fundamentals & Evaluation and managerial economics.

**Course Outcome:**

After learning the course, the students should be able to

1. Comprehend local building bye-laws and provisions of National Building Code in respect of building and town planning resulting in functionally efficient, economically viable and legally acceptable buildings.
2. Discuss and apply various aspects of principles of building planning and town planning



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3. Understand and implement various aspects of Principles of Architectural composition
4. Explain the principles of planning and design considerations to construct earthquake resistant building
5. Understand, interpret and prepare working drawings, foundation plans, perspective drawing and other executable drawings and prepare the drawing using software

## 6. Content

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Introduction :-</b> Definition of infrastructure, characteristics of infrastructure projects, scope of infrastructure management. Infrastructure in India: An Overview of the Power Sector in India. Water Supply and Sanitation Sector. The Road, Rail, Air and Port Transportation Sectors. Telecommunications Sector. The Urban Infrastructure, The Rural Infrastructure, An Introduction to Special Economic Zones, Organizations and Players in the field of Infrastructure. The Stages of an Infrastructure Project Lifecycle. An Overview of Infrastructure Project Finance.</p>	06	20%
II	<p><b>Privatization of Infrastructure :-</b> A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization. Problems with Infrastructure Privatization. Challenges in Privatization of Infrastructure. Privatization of Infrastructures in India. Introduction to infrastructure development through PPP route; Benefits of PPP Mode of procurement; Types of PPP Models and their contractual structure, Stakeholders' perspectives: Granting authority, Funders and Concessionaire, Government's role in successful PPP projects, Financial and Economic Appraisal of BOT Projects; VFM evaluation, PPP procurement process; Lifecycle of PPP projects, Contractual package of PPP project; Bankable concession agreement, Case study – Procurement process of Indian PPP projects</p>	06	20%
III	<p><b>Challenges to Successful Infrastructure Planning And Implementation:</b> Mapping and Facing the Landscape of Risks in Infrastructure Projects. Economic and Demand Risks. Political Risks. Socio-Environmental Risks. Cultural Risks in Infrastructure Projects. Legal and Contractual Issues in Infrastructure. Challenges in Construction and Maintenance of Infrastructure. Introduction to risk management concept, Risk analysis techniques,</p>	08	30%







	Risk mitigation strategies.		
IV	<p><b>Strategies for Successful Infrastructure Project Implementation:</b> Shaping the Planning Phase of Infrastructure Projects to mitigate risks. Designing Sustainable Contracts. Introduction to Fair Process and Negotiation.</p> <p>Negotiating with multiple Stakeholders on Infrastructure Projects. Sustainable Development of Infrastructure. Information Technology and Systems for Successful Infrastructure Management.</p> <p>Innovative Design and Maintenance of Infrastructure Facilities. Infrastructure Modeling and Life Cycle Analysis Techniques. Capacity Building and Improving the Government's Role in Infrastructure Implementation.</p>	<b>08</b>	<b>30%</b>

**Reference Books :**

1. Akintoye, A., Beck. M., and Hardcastle, C. (Eds.). (2003). Public-Private Partnerships “Managing risks and opportunities”. Oxford: Blackwell Science Limited.
2. Alvin Goodman, MakarandHastak, Infrastructure Planning Handbook: Planning, “Engineering and Economics” 1st Edition, MH/ASCE press.
3. Raghuram G (2001) “Infrastructure Development and Finncing” Towards A Public Private Partenership, Macmillan Publishers, New Delhi
4. Alagiri, “Infrastructure Development”, ICFAI University press, Hydrabad
5. Marcel Hertogh, Stuart Baker, Pau LianStaal-Ong and Eddy Westerveld, Managing Large.
6. Finnerty, J. D. (1996). Project financing - Asset-based financial engineering. New York: John Wiley & Sons, Inc.
7. Infrastructure Projects, ISBN/EAN 978-90-810025-2-3, NUR-code 801.
8. Merna, T., and Njiru, C. (2002). “Financing infrastructure projects” (First ed.). London: Thomas Telford.
9. Nevitt P. K., and Fabozzi F. J. (2000). “Project financing” (7 Ed.). London, UK: Euromoney Books.
10. Raghuram, G., Jain, R., Sinha, S., Pangotra, P., and Morris, S. (2000). “Infrastructure Development and Financing” Towards a Public-Private Partnership: MacMillan.

**Online Resources :**

<http://elearning.vtu.ac.in/>  
[www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)





**List of tutorials: -**

1. Introduction to infrastructure
2. Privatization of Infrastructure
3. Challenges to Successful Infrastructure Planning and Implementation
4. Strategies for Successful Infrastructure Project Implementation

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	-	3	2	1	2	2	-	-	-	-	3	1
CO-2	3	-	2	1	1	1	1	1	-	-	-	-	2	2
CO-3	2	-	2	-	1	-	-	-	-	-	-	-	2	1
CO-4	3	2	2	2	2	2	1	-	-	-	-	-	2	2
CO-5	3	-	-	2	3	1	-	-	-	-	-	-	2	1





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(Recognized by UGC under Section 22 & 2(f) of 1956)  
(Gujarat Private State University Act 4 of 2018)



**Gokul Global University, Siddhpur**

**Faculty of Engineering**



**Program :** Bachelor of Engineering

**Subject / Branch :** Computer Engineering

**Year :** 2023

**Semester :** VI

**Course title :** CYBER SECURITY

**Course code :** FEB160001

**Course type :** OE

**Course credit :** 03

**Pre-requisite :** Basic fundamental knowledge of computers, Internet and network.

**Rationale :** The use of the Internet for various purpose including social, business, communication and other day to day activities has been in common place. The information exchanged through Internet plays vital role for their owners and the security of such information/data is of prime importance. Knowing the concepts, principles and mechanisms for providing security to the information/data is very important for the students

**Teaching Examination Scheme :**

Teaching Scheme				Examination Marks				Total Marks
Th	Tu	P	Total	Theory		Practical		
				SEE (E)	PA (M)	Viva (V)	PA (I)	
0	2	2	4	-	-	80	20	100

**Course Objective :** Stay up to date with the latest cyber security news and trends and make sure you are implementing adequate cyber security measures in your organization using suitable hardware and software. Avoid the risks of phishing attacks by adhering to ethical



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security behavior. Understanding cloud computing and how it can help your business is vital for the success of your venture.

**Course Outcome :**After learning the course the students should be able to:

- CO-1: Understand the various tools and methods used in cybercrime.
- CO-2: Identify risk management processes, risk treatment methods, organization of information security.
- CO-3: Classify cyber security solutions and information assurance
- CO-4: Examine software vulnerabilities and security solutions to reduce the risk of exploitation
- CO-5: Analyze the cyber security needs of an organization
- CO-6: Understand key management issues and algorithms

**Content**

Sr.	Content	Total Hrs	% Weightage
1	Systems Vulnerability Scanning Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpcat and Windump, Wireshark, Ettercap, Hping Kismet	08	25%
2	Network Defense tools Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System	08	25%
3	Web Application Tools Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htrcrack, Pwdump, HTC-Hydra	08	25%





4	Introduction to Cyber Crime and law Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.	03	10%
5	Introduction to Cyber Crime Investigation Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Worms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks	05	15%

#### Reference Books:

1. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by NinaGodbole and SunitBelpure, Publication Wiley.
3. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley
4. Cyber Security and Cyber Laws Paperback – 2018 by Alfred Basta, Nadine Basta , Mary Brown , Ravinder Kumar, publication Cengage
5. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
6. Cyber security and laws – An Introduction, Madhumita Chaterjee, Sangita Chaudhary, Gaurav Sharma, Staredu Solutions

#### Suggested Readings :

#### Online Resources :

- [www.wireshark.org](http://www.wireshark.org)
- <https://www.kaspersky.co.in/resource-center/definitions/what-is-cyber-security>
- <https://www.javatpoint.com/what-is-cyber-security>
- <https://www.ibm.com/in-en/topics/cybersecurity>
- <https://www.softwaretestinghelp.com/cyber-security-books/>







**List of Suggested Practical:**

1. TCP scanning using NMAP
2. Port scanning using NMAP
3. TCP / UDP connectivity using Netcat
4. Network vulnerability using OpenVAS
5. Web application testing using DVWA
6. Manual SQL injection using DVWA
7. XSS using DVWA
8. Automated SQL injection with SqlMap

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	-	3	1	-	-	-	-	2	3	-	1
CO-2	-	-	-	-	-	-	-	2	-	-	-	-	1	-
CO-3	2	-	1	-	1	-	-	-	-	-	2	-	-	1
CO-4	-	-	-	-	-	2	1	-	-	-	-	1	2	-
CO-5	2	-	-	1	-	-	-	-	1	-	1	-	-	1
CO-6	-	1	-	-	1	2	-	1	-	-	-	-	1	-





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program :** Bachelor of Civil Engineering

**Subject / Branch :** Civil

**Year :** 3<sup>rd</sup>

**Semester:** 6<sup>th</sup>

**Course title :** REMOTE SENSING AND GIS      **Course code :** FEB160002  
**Course type :** Open Elective Courses      **Course credit :** 03

**Pre-requisite :** Basic Knowledge of Advanced Surveying

**Rationale :** To Develop A Basic Understanding About Geo-Spatial Techniques and Its Applications. To Enable the Students to Apply the Tools to Solve Various Problems Related to Civil Engineering.

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	00	00	100

#### Course Objective:

1. To develop technical skills and competence in data and information acquisition, extraction, management and analysis; spatial and statistical modelling; mapping and visualization.



### Course Outcome:

After learning the course, the students should be able to:

1. Observe, Identify and define simple/ complex problems of day to day lives present in Industry/ Society where GIS and Remote Sensing applications can be useful.
2. Apply knowledge of basic image interpretation and data image processing.
3. Integrate the existing data through various observations from various angles and layer creation.
4. Apply problem-solving methodologies to generate, evaluate and justify innovative solutions by designing and conducting/ analyzing and interpreting the data.
5. Demonstrate the ability to give solutions with an ability which can help communicate effectively for giving better interpretation and solutions.

### Content

Unit	Description in detail	Credit	Weightage
1	<b>Fundamental of Remote Sensing:</b> Definition –Components of Remote Sensing –Active and Passive Remote Sensing – Electro Magnetic Spectrum – Interaction of EMR With the Earth’s Surface – Interactions with the Atmosphere Energy Sources and Radiation. Active and Passive Remote Sensing. Energy Interaction in the Atmosphere. Energy Interaction with the Earth Surface Features. Data Acquisition and Recording. Remote Sensing Data Products.	04	20
2	<b>Image Interpretation and Digital Image Processing:</b> Introduction to Digital Image and Imaging Sensors Data Formats of Digital Image Display of Digital Image Processing Systems Strategies Keys Equipment’s Digital Image Processing Rectification and Restoration Enhancement of Image Transformation, Classification and Analysis.	04	20
3	<b>Geographic Information System:</b> Introduction to GIS Definitions of GIS and related terminology Components of GIS - GIS Data Georeferenced data Components of GIS Data input and output Data quality and Management	06	25
4	<b>Spatial Data Analysis:</b> GIS analysis functions Retrieval Reclassification Buffering and Neighborhood Overlaying Data Output Implementation of GISGIS Analysis functions of GIS and application areas Implementation Characteristics of Map Coordinate systems Map projections Georeferencing Frameworks and Reference Coordinate Systems	06	25
5	<b>Software:</b> GIS and Image interpretation Software Salient features Capabilities and Limitations. Data management in different GIS	08	10





	software Spatial Data Models Attribute Data Management <b>Applications:</b> Application of Remote Sensing / GIS Case studies. GIS and Remote Sensing Usefulness in Civil Engineering.		
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**Reference Books :**

1. Remote Sensing and image Interpretation, Author: Lilliesand T.M. and Kiefer R.W.,Publisher : John Wiley and Sons
2. Remote Sensing and Geographical information System,Author : A.M. Chandra and S.K. Ghosh,Publisher : Narosa Publishing House
3. Principles of Geographic Information Systems, Author: Burrrough P.A and mcdonnellR.A.,Publisher : Oxford university press
4. Essentials of GPS, Spatial Network Pvt.Ltd.,Author : Agrawal N.K.,Publisher : Hydrabad
5. Concepts and Techniques of Geographical Information Systems,Author : Lo C.P. and Yeung Albert K.W.,Publisher : Prentice-Hall of India Pvt. Ltd.

**Online Resources :**

<http://en.wikipedia.org/wiki/remotesensing>

<http://en.wikipedia.org/wiki/gis>

**Practical / Activities :**

1. Projects on Water Resource Mapping and Management.
2. Projects on Land Use Mapping and Land Resource Management.
3. Projects on Site Selection for major infrastructure.
4. Projects on Natural Disaster Mitigation and Management.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	3	2	3	3	3	1	2	2	2	3	2	1
CO-2	3	3	3	3	3	2	1	2	1	1	1	1	2	1
CO-3	3	3	3	1	3	1	2	1	1	1	1	1	1	-
CO-4	3	3	3	3	3	1	3	1	1	1	1	1	1	1
CO-5	2	2	2	2	1	1	3	1	1	1	2	1	2	-





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 3<sup>rd</sup>

**Semester** : VI

**Course title** : Environmental Engineering

**Course code** : FEB160101

**Course type** : Professional Core Course

**Course credit** : 04

**Pre-requisite** : Basics of Environmental Engineering.

**Rationale** : The Civil engineer must be aware of the environmental effects of pollutants and should be able to understand the pollutants, their characteristics and manage systems to mitigate them. The water is basic requirement for humans and should be available in pure and potable form to keep the community away from waterborne diseases and treatment of wastewater is absolutely needed to protect the health of people.

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	2	5	4	70	30	30	20	150

#### Course Objective :

To design and understand the application of treatment system.

#### Course Outcome :

After learning the course, the students should be able to:

1. Understand the role of microorganisms in various components of environments
2. Understand the quality and characteristics of waste water
3. Design and prepare drainage plan of buildings



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4. Understand and design solid waste management system
5. Understand various types of pollution
6. Understand various environmental Acts.

## Content

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Introduction</b> Components of environment, Types of microbes, their growth and role in environment.</p> <p><b>Quality and Quantity of Water for supply to towns/Cities:</b> Sources of water, Assessment of domestic and industrial requirement, Water borne diseases and their control, The water (prevention and control of pollution) Act – 1974.</p>	10	15%
II	<p><b>Characteristics of Wastewater:</b> Indian Standards for effluent to be disposed in receiving water body like rivers, estuaries, lakes, sea and oceans. Study of characteristics of several industrial wastewaters like textile, chemical dairy and pharmaceutical wastewaters. Disposal of treated wastewaters (i) into inland surface waters; (ii) into oceans; (iii) into public sewers (iv) into estuaries and (v) onto land. Effect of organic pollution on Stream, river water quality, and self-purification, DOSAG Curve.</p> <p><b>Water Treatment processes and Treatment units:</b> Plain sedimentation, aeration, sedimentation tank, sedimentation with coagulation, types of coagulants, mixing devices, theory of filtration, types of filters and their comparison, Hardness, methods of removing hardness.</p>	08	18%
III	<p><b>Solid Waste Management:</b> Quantity composition and characteristics of solid wastes. Classification of solid wastes. Hazardous solid wastes, Biomedical solid wastes, Typical generation rate for solid wastes, factors affecting the generation rate. Estimation of quantity of solid waste, Onsite handling, storage and processing, collection services, types of collection systems. Determination of vehicle and labor requirements, collection routes, transfer stations, location of transfer stations, transfer means and methods, solid waste processing techniques, Mechanical volume reduction, Thermal volume reduction, manual component separation. Ultimate disposal, land filling with solid waste, Design of landfills.</p> <p><b>Air Pollution:</b> Definition, Composition of atmospheric air, Classification and sources of air pollutants. Effects of air pollution on human, plant and material, Air pollution control methods, equipment and safety.</p>	12	32%





	Salient features of the Air (Prevention and control of pollution) Act – 1981. <b>Noise Pollution:</b> Sources, Effects and control of noise pollution.		
IV	<b>Collection of sewage &amp; estimation of its discharge:</b> Different types of sewers, sewerage systems, variation in sewage flow, sewer appurtenance, separate and combined sewerage systems <b>Unit operations/ processes for wastewater treatment:</b> Layout plan and section of municipal wastewater treatment plant, Physical unit operation screening, flow equalization, mixing, flocculation, sedimentation. Chemical unit processes-chemical precipitation. Biological unit processes: Aerobic attached growth and aerobic suspended growth treatment processes, anaerobic suspended growth treatment processes, an aerobic suspended growth treatment processes, lowcost sanitation systems, septic tanks, soak pit, stabilization ponds. <b>Design of wastewater treatment units:</b> Design of racks, screens, grit chamber, aeration units, primary & secondary clarifiers, activated sludge plant and trickling filter units, rotating biological contactors, sludge dewatering units, sludge digesters and drying beds	12	35%
V	<b>Determination of Various Agents (laboratory hours):</b> Water Standards – IS10500, Impurities in water, Indian standards for drinking water, Computation of hardness Optimum dose of coagulants, Physical, chemical and biological characteristics of domestic and Industrial wastewaters. BOD and COD, Measurement of sound <b>Estimation and Design (laboratory hours):</b> Design of sedimentation tank, Design of flocculation unit, design of slow & rapid sand filter, washing of filter, methods of disinfection, estimation of wastewater discharge in a sewer in sewerage system, estimation of storm water discharge in urban area	<b>This portion to be covered in Laboratory</b>	<b>Theory weightage shall be Zero</b>

**Reference sssBooks :**

1. H.S. Peavy, D.R. Rowe and G. Tchbanoglous, Environmental Engineering, McGraw Hill International Edition.
2. M. L. Davis, Water and waste water Engineering, Mc Graw Hill education (India) Pvt. Ltd. 2013 edition.
3. A. P. Sincero and G.A. Sincero, Environmental Engineering, Prentice Hall of India, New Delhi.
4. G. Tchabanoglous, Solid Waste Treatment and Disposal, McGraw Hill Pub.
5. G.S. Birdie and J.S. Birdie, Water Supply and Sanitary Engineering, DhanpatRai Publishing Co. New Delhi.





7. H.C. Parkins, Air Pollution, McGraw-Hill Pub.
8. J.A. Salvato, Environmental Sanitation, Wiley Interscience.
9. L.W. Canter, Environmental Impact Assessment, McGraw Hill Pub.
10. M.L. Davis and D.A. Cornwell, Introduction to Environmental Engineering,  
11. McGraw Hill International edition.
12. Metcalf and Eddy, (Revised by G. Tchobanoglous Wastewater Engineering:  
13. Treatment, disposal Reuse, Tata-McGraw Hill, New Delhi.
14. Environmental engineering volume 1 and 2 by S.K.Garg, Khanna publisher
15. Environmental engineering volume 1 and 2 by B.C.Punamia, laxmi publication
16. Environmental engineering volume 1 and 2 by Dr.P.M.Modi
17. Water supply and sanitary engineering by G.S.Birdie and J.S.Birdie
18. Environmental pollution engineering by C.S. Rao wiley eastern
19. Water supply and wastewater engineering by B.S.N Raju, Tata McGraw hill, New  
Delhi
20. Viesman, Hammer and Chadik, water supply and pollution control, PHI Publication.

#### **Online Resources :**

1. <http://elearning.vtu.ac.in/>
2. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

#### **List of Suggested Practical:**

1. Introduction to Equipment in Environmental Engineering Laboratory, Standards, Sampling, Collection and Preservation of samples
2. Introduction to Determination of pH, Acidity, Alkalinity of Raw Water
3. Determination of Temporary, Permanent and Total Hardness in Raw Water
4. Determination of Dissolved Oxygen by Winkler (Azide Modification) Method
5. Determination of Chloride content & Residual Chlorine in Water
6. Determination of Chlorine content available in bleaching powder.
7. Determination of Turbidity of given Water Sample using Nephlo-metric Turbidity Meter.
8. Determination of Various Solids (suspended, dissolved and settleable) in Sewage/Waste Water
9. Determination of Iron & Manganese content in Raw Water.
10. Determination of Sodium, Nitrates content & Potassium content in Raw Water.
11. Determination of optimum dose of coagulate
12. Determination of BOD and COD in sewage water.
13. Measurement of noise at different sources using sound meter
14. Design of sedimentation tank, slow & rapid sand filter
15. Estimation of wastewater discharge in sewerage system.





Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	-	1	2	1	-	1	2	-	-	-	-	1	-	2
CO-2	-	2	2	1	-	1	3	-	-	-	1	1	-	2
CO-3	2	2	2	-	-	2	2	-	-	-	-	-	-	-
CO-4	1	2	2	2	2	1	3	-	-	-	1	1	-	1
CO-5	1	2	-	-	-	1	2	-	-	-	-	-	-	-
CO-6	-	-	-	-	-	1	3	2	-	-	-	1	-	-





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program :** Bachelor of Civil Engineering

**Subject / Branch :** Civil

**Year :** 3<sup>rd</sup>

**Semester:** 6<sup>th</sup>

**Course title :** Hydraulic Engineering

**Course code :** FEB160102

**Course type :** Professional Core Course

**Course credit :** 04

**Pre-requisite :** Fluid Mechanics

**Rationale :** To develop basic understanding for solving field problems related to fluid Flow through pipes, open channels, turbo-machines and perform model analysis.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
03	00	02	05	04	70	30	30	20	150

**Course Objective:**

1. Hydraulic Engineering, as a sub-discipline of Civil Engineering and is concerned with the flow and conveyance of fluids.
2. This course covers topics like viscous fluid flow, laminar and turbulent flow, boundary layer analysis, dimensional analysis, open channel flows, flow through pipes, and computational fluid dynamics.
3. The objective of this course is to introduce various hydraulic engineering problems like open channel flows and hydraulic machines.



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### Course Outcome:

1. The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
2. They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
3. They will have knowledge in hydraulic machineries (pumps and turbines).
4. Analyze and design streamlined objects considering boundary layer effects.
5. Carry out model studies for fluid flow problems

### Content

Unit	Description in detail	Credit	Weightage
I	<b>Laminar Flow-</b> Laminar flow through: circular pipes, annulus and parallel plates. Stokes's law, Measurement of viscosity. <b>Turbulent Flow-</b> Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram.	6	14
II	<b>Boundary Layer Analysis-</b> Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control. <b>Dimensional Analysis and Hydraulic Similitude:</b> Dimensional homogeneity, Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem.	9	22
III	<b>Introduction to Open Channel Flow-</b> Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. <b>Uniform Flow-</b>	5	12





	Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient " $n$ ". <i>Most economical section of channel</i> . Computation of Uniform flow, Normal depth.		
IV	<p><b>Non-Uniform Flow-</b> Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity- Current meter, Floats, Hot-wire anemometer. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical, numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method.</p> <p><b>Hydraulic Jump-</b> Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges. Dynamics of Fluid Flow- Momentum principle, applications: Force on plates, pipe bends, moments of momentum equation,</p>	6	14
V	<p><b>Flow through Pipes:</b> Loss of head through pipes, Darcy-Weisbach equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes, nozzles. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures, branching of pipes, three reservoir problem.</p> <p><b>Computational Fluid Dynamics:</b> Basic equations of fluid dynamics, Grid generation, Introduction to in viscid incompressible flow, Boundary layer flow as applicable to C.F.D. Hydro informatics: Concept of hydro informatics –scope of internet and web-based modeling in water resources engineering.</p>	16	38

**Reference Books :**

1. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House





2. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
3. Open channel Flow, K. Subramanya, Tata McGraw Hill.
4. Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
5. Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971

**Online Resources :**

<http://en.wikipedia.org/wiki/Hydraulics>

**Practical / Activities :**

1. Studies in Wind Tunnel
2. Boundary Layer
3. Uniform Flow
4. Velocity Distribution in Open channel flow
5. Venturi Flume
6. Standing Wave Flume
7. Gradually Varied Flow
8. Hydraulic Jump
9. Flow under Sluice Gate
10. Turbulent flow through pipes
11. Laminar flow through pipes
12. Major losses / Minor losses in pipe

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	2	2	-	-	2	-	-	-	-	-	2	3
CO-2	3	3	1	2	-	-	2	2	-	-	-	-	2	2
CO-3	2	1	1	1	-	-	-	-	-	-	-	-	1	2
CO-4	3	1	3	1	-	-	-	-	-	-	-	-	2	2
CO-5	3	3	1	2	-	1	2	2	-	-	-	-	3	2





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program :** Bachelor of Civil Engineering

**Subject / Branch :** Civil

**Year :** 3<sup>rd</sup>

**Semester:** 6<sup>th</sup>

**Course title :** Soil Engineering – II

**Course code :** FEB160103

**Course type :** Professional Core Course

**Course credit :** 04

**Pre-requisite :** Knowledge of Geo-Techniques & Applied Geology and Soil Mechanics

**Rationale :** Any civil engineering structure needs a strong and stable foundation which depends on proper understanding of soil behavior, determination and interpretation of soil parameters, determination of stresses in soil. The design of any foundation system is based on understanding of soil parameters and its implication based on through interaction with type of structure. The course on Foundation Engineering provides the students basic knowledge on foundation selection, foundation forces, foundation design and its stability under seismic forces. Various types of foundation and their analytical solution helps the student to design suitable foundations with respect to soil and site condition.

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
03	00	02	05	04	70	30	30	20	150





### Course Objective:

1. To impart knowledge on the various factors governing the Engineering behaviour of soils and the suitability of soils for various Geotechnical Engineering applications.
2. To characterize stress-strain behaviour of soils, the failure criteria and to evaluate the shear strength and compressibility parameters of soils.

### Course Outcome:

After learning the course, the students should be able to:

1. Select appropriate soil investigation/testing technique/method and get true sub soil parameters used for selection of type of foundation as per codal guidelines.
2. Select and design appropriate/suitable foundation system (shallow/Deep) for different structures that satisfy the allowable bearing capacity and settlement requirements based on soil properties.
3. Design deep foundation satisfying bearing capacity and settlement requirements.
4. Design and analysis of retaining walls and sheet piles under static loads.
5. Understand the engineering behavior of expansive soils and selection of suitable foundation type for such soils.

### Content

Unit	Description in detail	Credit	Weightage
I	<b>Unit 1: Stability of slope</b> Infinite and finite slopes, factor of safety, type of slope failure, stability of infinite slopes, finite slopes form of slip surfaces, limit equilibrium method and critical stage instability analysis, effects of tension crack and submergence, C-analysis-method of slices, Taylor's stability no., use of Bishop's method. <b>Introduction to Geosynthetics</b> Introduction to geosynthetics-types and its application in various field of civil engineering.	09	25%
II	<b>Unit 2: Earth Pressure</b> Determination of lateral earth pressure under different conditions, Rebhann's and culminnn's Graphical methods of determination of lateral earth pressures. <b>Stress Distribution of Soils</b> Causes of stress in soil, geostatic stress, Boussinesq's equation, stress distribution diagrams, New-mark's influence chart Westergard's equation, contact pressure, stresses due to triangular and other loadings.	08	25%







III	<b>Unit 3: Selection of Foundation and Sub-Soil Exploration /Investigation:</b> Types of foundation, Factors affecting the selection of type of foundations, steps in choosing types of foundation based on soil condition, Objectives and planning of exploration program, methods of exploration-wash boring and rotary drilling-depth of boring, soil samples and soil samplers-representative and undisturbed sampling, field penetration tests: SPT, SCPT, DCPT. Introduction to geophysical methods, bore log and report writing, data interpretation.	08	15%
IV	<b>Unit 4: Shallow Foundation</b> Introduction, significant depth, design criteria, modes of shear failures. Detail study of bearing capacity theories (Prandtl, Rankine, Terzaghi, Skempton), bearing capacity determination using IS Code, Presumptive bearing capacity. Settlement, components of settlement & its estimation, permissible settlement, Proportioning of footing for equal settlement, allowable bearing pressure. Bearing capacity from in-situ tests (SPT, SCPT, PLATE LOAD), Factors affecting bearing capacity including Water Table., Bearing capacity of raft/mat foundation as per codal provisions, Contact pressure under rigid and flexible footings.	09	15%
V	<b>Unit 5: Pile Foundation</b> Introduction, load transfer mechanism, types of piles and their function, factors influencing selection of pile, their method of installation and their load carrying characteristics for cohesive and granular soils, piles subjected to vertical loads- pile load carrying capacity from static formula, dynamic formulae (ENR and Hiley), penetration test data & Pile load test (IS 2911).	08	20%

#### Reference Books :

1. P. Purushothama Raj; Soil Mechanics and Foundation Engineering; Pearson Education.
2. B.C. Punamia; Soil Mechanics & Foundation Engineering; Laxmi Pub. Pvt. Ltd., Delhi.
3. Das, B.M., Principles of Foundation Engineering, Nelson Engineering.
4. Tomlinson, M. J., Foundation Design and Construction, Prentice Hall.
5. V. N. S. Murthy; Soil Mechanics & Foundation Engineering; Sai Kripa Technical Consultants, Bangalore

#### Online Resources :

<http://en.wikipedia.org/wiki/geotechengineering>



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**Practical / Tutorial:**

1. Collection of samples of soil and identification of their types
2. Collection of literature on different types of slope stability structure.
3. Development of spreadsheets/computer programmers for the design of shallow and deep foundation.
4. Design of foundation of real-life structure using open-source/commercial software
5. Design of retaining wall for any underpass/bridge of your local city.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	2	2	2	-	-	-	3	-	-	-	-	1	2
CO-2	1	2	1	1	-	-	1	-	-	-	1	-	1	3
CO-3	1	2	3	1	-	-	-	1	-	-	1	-	3	3
CO-4	2	2	3	1	-	-	-	1	-	-	1	-	3	3
CO-5	1	2	3	1	-	-	-	-	-	-	-	-	1	2





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 3<sup>rd</sup>

**Semester :** VI

**Course title :** Transportation Engineering- II

**Course code :** FEB160104

**Course type :** Professional Core Course

**Course credit :** 04

**Pre-requisite :** Nil

**Rationale :** Railway is important mode of surface transportation. Railways are economic for the long-distance transportation of passengers and freight on the land. India has the second largest Railway network in the world. At present in the India, the share of goods transportation in railway is reduced than the roadways. There is a very good scope of developing high speed trains and special corridors for freight transportation in India. Bridges and Tunnels are essential to provide safe and economic passage over/through obstructions to railway or road corridor. The study of this subject provides necessary knowledge of railway track, its component parts, geometric design, points and crossings. It also provides knowledge of types of bridges, bridge super structure and sub structure, loads acting on bridges. It also provides basic knowledge about Tunnel. Harbour and Airports are important infrastructure for economic growth of any country. It requires large scale planning, design and construction. It requires huge amount of investment. Precise engineering skill is required for the planning, design and construction and maintenance of Harbour and Airport engineering. The subject covers the fundamental knowledge of various important elements of Harbour and Airport Engineering.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	3	3	70	30	30	20	150



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**Course Objective :**

1. To understand the various elements of Railway engineering.
2. To understand fundamentals of planning and design of various airport structures
3. To understand the various elements of Bridge engineering.

**Course Outcome :**

After learning the course, the students should be able to:

1. Know about railway track components, their materials, size, function and importance
2. Carry out geometric design of railway track
3. Know about various components in diverging, merging and crossings of railway tracks, stations, yards, signaling, interlocking and control systems.
4. Know about requirements of railway track for high-speed trains, safety aspects and maintenance
5. Understand about different types of bridges, their components, loads/stresses acting on bridges, requirement and function of the components, hydrological design, methods of erection, maintenance of bridges.
6. To understand the various elements of Harbour and Airport

**Content**

Unit	Description in detail	Total Hrs	Weightage
I	<b>Module 1: Railway Engineering</b> Development of railways in India, Permanent way and railway track components, different gauges in India, conning of wheels, function and types of rails, rail sections, defects in rails, creep of rails, rail joints and welding of rails, sleepers – types, spacing and density, rail fixtures and fastenings, ballast, subgrade and embankment. Geometric design of railway track: gradients, grade compensation, speed of trains on curves, super elevation, cant deficiency, negative super elevation, curves, widening on curves. Railway traction and track resistance, stresses in railway track – rails, sleepers, ballast. Points and crossings – turnouts, switches, crossings	15	35%
II	<b>Module 2: Bridge Engineering</b> Classification of bridges – with respect to construction materials, structural behavior of super structure, span, sub structure, purpose. Temporary and movable bridges. Factors affecting site selection. Various loads/stresses acting on bridges. Bridge hydrology – design discharge, water way, afflux, scour depth, economical span. Bridge	13	30%





	components – foundation, piers, abutments, wing wall, approach, bearings, floor, girders, cables, suspenders.		
III	<p><b>Module 3: Harbor and Airport</b></p> <p>History of water transportation at world level and at national level development and policy, classification of harbors, natural and artificial. Major ports in India, administrative set up. Harbour components, ship characteristics, characteristics of good harbour and principles of harbour planning, size of harbour, site selection criteria and layout of harbours. Surveys to be carried out for harbor planning. General design aspects.</p> <p>History, development, policy of air transport, aircrafts, aerodromes, air transport authorities, air transport activities, aircrafts and its characteristics, airport classifications as per ICAO. Regional planning-concepts and advantages, location and planning of airport as per ICAO and F.A.A. recommendations, airport Elements, estimation of future air traffic, development of new airport, requirements of an ideal airport layout</p>	<p><b>This portion will be covered in laboratory hours</b></p>	<p><b>35%</b></p>

#### Reference Books :

1. Satish Chandra and M.M. Agrawal, Railway Engineering, Oxford University Press, New Delhi
2. S.C. Saxena and S. P. Arora, A Text Book of Railway Engineering, Dhanpat Rai & Sons, New Delhi
3. S.C. Rangwala, K.S. Rangwala and P.S. Rangwala, Principles of Railway Engineering, Charotar Publishing House, Anand.
4. S.P. Bindra, Principles and Practice of Bridge Engineering, Dhanpat Rai & Sons, New Delhi
5. S.C. Saxena, Tunnel Engineering, Dhanpat Rai & Sons, New Delhi
6. D.J. Victor, Essential of Bridge Engineering, Oxford & IBH Pub. Co. Ltd. Mumbai
6. Dr. S. K. Khanna, M.G.Arora and S.S. Jain, Airport Planning & Design, Nem Chand & Bros., Roorkee
7. G.V. Rao Airport Engineering, Tata McGraw Hill Pub. Co., New Delhi
8. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, Charotar Pub. House, Anand
9. S. P. Bindra, A Course in Docks and Harbour Engineering, 1992, Dhanpat Rai & Sons, New Delhi
10. Airport Engineering, Charotar Publishing House Pvt. Ltd, Anand

#### Online Resources :

<http://elearning.vtu.ac.in/>  
[www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)



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Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	2	3	2	1	3	-	2	-	-	-	-	3	2
CO-2	3	2	2	3	-	-	-	-	-	-	1	-	2	1
CO-3	2	2	2	-	-	2	1	1	1	2	1	-	2	2
CO-4	1	1	2	2	1	2	-	-	-	-	1	-	2	1
CO-5	3	2	2	1	1	1	1	1	-	-	1	-	1	1
CO-6	1	-	-	-	1	2	-	-	-	-	-	-	-	-





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 3<sup>rd</sup>

**Semester :** VI

**Course title :** Concrete Technology & Repair Strategy

**Course code :** FEB160105

**Course type :** Professional Elective Course

**Course credit :** 04

**Pre-requisite :** NIL.

**Rationale :** This subject is conceptual applications of principles of management to mitigate various disasters.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	2	5	4	70	30	30	20	150

**Course Objective :**

1. Concrete technology deals with study of properties of concrete and its practical applications. In a building construction, concrete is used for the construction of foundations, columns, beams, slabs and other load bearing elements.
2. Qualifying the students in controlling the quality of fresh and hardened concrete in both lab and field.
3. Retrofitting is making changes to an existing building to protect it from flooding or other hazards such as high winds and earthquakes.



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**Course Outcome :**

1. Understand the objects and necessity of repair and rehabilitation of structures
2. Comprehend the deterioration mechanism of concrete structures
3. Understand the cracking of concrete and it's preventive measures
4. Discuss the structural health monitoring and it's techniques
5. Converse the techniques and materials for the repair

**Content**

Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	<b>Introduction of concrete:</b> Historic development,. Composition of concrete ,advantage of concrete cover and material of concrete, ,advantage and future trends in concrete Overview of Sustainability and Concrete development	04	10%
II	<b>Fresh Concrete:</b> Properties of fresh concrete, Definition and Measurement methods of workability as per IS and ASTM standards,factors affecting workability, Segregation & Bleeding, Slump loss, Re-tempering, Site preparations for concreting, Mixing, Conveying, Placing, Compaction, Finishing of concrete. Curing & various method <b>Hardened concrete :</b> strength of hardened concrete Various tests of hardened concrete (tensile, compressive, flexural and bond test (Destructive, Semi-destructive, Non- destructive): Field & laboratory testing procedures for evaluating the structure for strength, corrosion activity, performance & integrity, durability. Interpretation of the findings of the tests.	12	30%
III	<b>Deterioration of concrete structures:</b> Types of deterioration – Signs, causes & symptoms, Mechanism of deterioration, contributing factors like permeability, inadequate durability & micro-structure of concrete. Physical deterioration due to moisture, temperature, shrinkage, freeze-thaw, abrasion, erosion, cavitation, crystallization of salts, Efflorescence, exposure to severe environment like marine exposure. Chemical deterioration due to corrosion of reinforcement (chloride induced, carbonation induced), Alkali-silica reaction, sulphate attack, Acid attack. <b>Mix design of concrete:</b> Principles of concrete mix design, and parameter and factor influencing mix design Indian standard method for mix design, various provision for mix design as per IS code	12	25%





<b>IV</b>	<p><b>Repairs, rehabilitation &amp; Retrofitting of concrete structures:</b>  <b>Repair materials</b> - Criteria for durable concrete repair, Methodology, performance requirements, repair options, selection of repair materials, Preparatory stage of repairs, Different types of repair materials &amp; their application, types of repair techniques.  <b>Retrofitting/Strengthening:</b> Need for retrofitting, Design philosophy of strengthening structures, Techniques available for strengthening including conventional and advanced techniques.  <b>Seismic retrofit of concrete structures :</b>Deficiencies in structure requiring seismic retrofit, Design philosophy, Techniques to enhance the seismic resistance of structures, advanced techniques for making seismicresistant structures</p>	<b>10</b>	<b>25%</b>
<b>V</b>	<p><b>Special concrete and concreting method advanced cement based composition, fiber reinforced concrete</b>  Polymer modified concrete ,self- compacting concrete,light weight concrete,high strength concrete,lightweight and heavyweight concrete, high volume fly ash concrete  Special concreting method: pumped concrete,ready mix concrete, under water concreting , Hot &amp; cold weather concrete,precast concrete</p>	<b>04</b>	<b>10%</b>

**Reference Books :**

1. Properties of Concrete - Neville A. M.
2. Concrete Microstructure, Properties and Materials –P.Kumar Mehta / Paulo J.M.Monteiro
3. Concrete Technology- Shetty M. S.
4. Advanced Concrete Technology – ZONGJIN Li
5. Concrete Technology- Gambhir M. L.
6. Concrete Technology by A.R. Santhakumar, IIT Madras

**Online Resources :**

1. <https://old.amu.ac.in/emp/studym/1821.pdf>
2. <https://easyengineering.net/concrete-technology-books-collection-new/>

**List of Suggested Practical:**

- a. Tests on cement, aggregates, Design & making of concrete,
- b. Tests on fresh concrete, Hard concrete (destructive & non-destructive test methods),





Open Ended Problems:

1. Prepare Chart listing all the Indian Standard Codes relevant to testing of Sand, aggregate, cement, bricks, mix design, special concrete, concrete testing, reinforced cement concrete, non-destructive testing etc.
2. Prepare chart showing stepwise procedure for tests on Cement, Aggregate, mortar, Testing of fresh & hardened concrete, Non-destructive testing of concrete.  
Prepare 3 specimens each of Plain concrete & Reinforced cement concrete of M20 grade. Test it under flexure and compare the failure, Plot the stress vs strain graph for the same. Subject the beam specimens to aggressive deterioration (like alternate wetting & drying, salt exposure), test the beams for carbonation and strength loss (if any).

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	-	-	1	-	2	1	-	-	-	-	2	-	2
CO-2	2	-	-	1	-	2	1	-	-	-	-	2	1	1
CO-3	2	-	-	1	-	2	1	-	-	-	-	2	-	1
CO-4	2	-	-	1	-	2	1	-	-	-	-	2	-	1
CO-5	2	-	-	1	2	2	1	-	-	-	-	2	1	1







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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 3<sup>rd</sup>

**Semester :** VI

**Course title :** DISASTER ASSESSMENT  
USING GEOSPATIAL  
TECHNIQUES

**Course code :** FEB160106

**Course type :** Professional Elective Course

**Course credit :** 04

**Pre-requisite :** NIL.

**Rationale :** NIL

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	2	5	4	70	30	30	20	150

**Course Objective :**

4. Describe and utilize spatial data, GIS and remote sensing in disaster risk assessment and management
5. Apply GIS/remote sensing in hazard, vulnerability and risk assessment
6. Apply GIS/remote sensing to post-disaster damage assessment

**Course Outcome :**

After learning the course, the students should be able to:

1. Use GIS and GPS techniques for location-based mapping and monitoring



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2. Address issues pertaining to resource identification, distribution, allocation through RS and GIS techniques
3. Analyse the pre and post disaster conditions for smoothen the functional mechanism
4. Visualize hazard and risk information
5. Employ risk information in emergency preparedness planning

## Content

Sr No.	Subject Content	Teaching Hours	Weightage (%)
I	<b>Module – I</b> Basic concepts of remote sensing, Airborne and space borne sensors, Data acquisition, Indian Space Program.	05	15
II	<b>Module–II</b> Digital Image Processing: Introduction, Image Processing Systems, Digital Image, Media for digital data recording, Storage, Data formats, Pre-processing, Image enhancement, Transformation and Classification.	09	25
III	<b>Module–III</b> Introduction to Microwave remote sensing and Global Positioning System.	05	10
IV	<b>Module–IV</b> Geographical Information System: Concept of GIS, Functions and advantages of GIS, Spatial data model, Attribute management and metadata concept, Data sources, linking spatial and attribute data, Organizing data for analysis, Geospatial analysis.	10	25
V	<b>Module–V</b> 1.Integration of GIS and Remote Sensing, Analysis and Presentation.2. Disaster Assessment: Types of natural disasters- landslides, earthquakes-tsunami cyclones- floods-snow avalanche, Case studies for disaster assessment using Geospatial techniques, Use of Remote Sensing & GIS software for disaster assessment.	10	25

## Reference Books :

1. Remote Sensing and Geographical Information System, Author: A.M. Chandra and S.K. Ghosh, Publisher: Narosa Publishing House, New Delhi.



2. Remote Sensing and GIS, Author: B. Bhatta, Publisher: Oxford University Press, New Delhi
3. Fundamentals of Remote Sensing, Author: G. Joseph, Publisher: University Press, Hyderabad
4. Introduction to Geographic Information Systems, Author: Kang-tsuugChang, Publisher : Tata McGraw-Hill Publishing Co. Ltd., New Delhi
5. Principles of Geographical Information Systems, Author: P.A. Burrough and R.A. McDonnell, Publisher: Oxford University Press, Oxford, England

### Online Resources :

3. <https://www.linkedin.com/pulse/gis-remote-sensing-disaster-risk-management-course-mark-muriithi-2c>
4. [https://www.preventionweb.net/files/74066\\_MOOC\\_UNOOSA\\_CSSTEAP\\_GeospatialDRR.pdf](https://www.preventionweb.net/files/74066_MOOC_UNOOSA_CSSTEAP_GeospatialDRR.pdf)

### List of Assignments :

1. Assignment 1: Basic Concepts of Remote Sensing
2. Assignment 2: Digital Image Processing
3. Assignment 3: Microwave Remote Sensing and GPS
4. Assignment 4: Geographic Information System (GIS)
5. Assignment 5: Integration of GIS and Remote Sensing

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	-	-	-	1	1	1	1	-	1	1	1	2	1
CO-2	3	-	-	-	2	1	1	2	2	1	2	-	1	-
CO-3	3	1	-	-	2	1	1	1	1	-	2	-	1	-
CO-4	3	-	-	1	1	2	2	1	1	-	1	1	1	-
CO-5	3	1	-	1	2	1	1	1	2	1	1	-	1	1



## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program:** Bachelor of Engineering

**Subject /Branch:** Civil Engineering

**Year :** 4<sup>th</sup>

**Semester :** VII

**Course title :** INTEGRATED  
PERSONALITY DEVELOPMENT

**Course code :** FEB170001

**Course type :** Open Elective Course

**Course credit :** 03

**Pre-requisite :** Nil

**Rationale :** This course aims to help a person understand and know his / her purpose in life, get a positive thought pattern, gain confidence, improve behaviour, learn better communication and develop a healthy physique with morality and ethics in its core. Today youth lack the guidance to face insecurity about their health and career, premature relationships and family breakdown, addictions and substance abuse, negative impact of internet and social media etc. This course includes such topics that will cover all aspects and provide solution to the current challenges through creative and interactive activities. This course will allow students to enjoy, understand and practice invaluable lessons preparing them for a successful future.

#### Teaching Examination Scheme:

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	0	3	3	70	30	00	00	100

#### Course Objective:

1. To provide students with a holistic value-based education that will enable them to be successful in their academic, professional, and social lives.



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2. To give the students the tools to develop effective habits, promote personal growth, and improve their wellbeing, stability, and productivity.
3. To allow students to establish a stronger connection with their family through critical thinking and development of qualities such as unity, forgiveness, empathy, and effective communication.
4. To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.
5. To enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.
6. To inspire students to strive for a higher sense of character by learning from role models who have lived principled, disciplined, and value-based lives.

### Course Outcomes:

After learning the course the students should be able to:

1. To provide students with a holistic education – focused on increasing their intelligence quotient, physical quotient, emotional quotient and spiritual quotient.
2. To provide students with hard and soft skills, making them more marketable when entering the workforce.
3. To educate students on their social responsibilities as citizens of India and have a greater sense of social responsibility.
4. To provide students with a value-based education which will enable them to be successful in their family, professional, and social relationships by improving their moral and ethical values.
5. To teach self-analysis and self-improvement exercises to enhance the potential of the participants.
6. To have a broader sense of self-confidence and a defined identity.

### Content

Sr.	Content	Total Hrs	% Weightage
1	<b>Facing Failures:</b> Factors Affecting Failures Failures are not Always Bad Insignificance of Failures Power of Faith Practicing Faith <b>Learning from Legends:</b> Tendulkar & Tata Leading Without Leading	9	22
2	<b>Mass Management:</b> Project Management <b>My India My Pride:</b>	11	26







	Glorious Past - Part 1, Glorious Past - Part 2, Present Scenario, An Ideal Citizen – 1, An Ideal Citizen – 2, An Ideal Citizen - 3		
3	<b>Remaking Yourself:</b> Restructuring Yourself Power of Habit Being Addiction-Free Begin with the End in Mind Handling the Devil – Social Media <b>Financial Wisdom:</b> Basics of Financial Planning Financial Planning Process	8	20
4	<b>From House to Home:</b> Affectionate Relationships Forgive & Forget Listening & Understanding Bonding the Family <b>Soft Skills:</b> Teamwork & Harmony Networking decision making leadership	8	18
5	<b>Review:</b> Student Voice – 1, Student Voice – 2, Words of Wim	6	14

#### Reference Books :

1. Thomas Edison's factory burns down, New YorkTimes Archives, Page 1, 10/12/1914
2. Lincoln Financial Foundation, Abraham Lincoln's "Failures": Critiques, Forgotten Books, 2017
3. The Wit and Wisdom of Ratan Tata, Ratan Tata, Hay House, 2018
4. The Tata Group: From Torchbearers to Trailblazers, Shashank Shah, Penguin Portfolio, 2018
5. Project Management Absolute Beginner's Guide, Gregory Horine, Que Publishing, 2017
6. The Fast Forward MBA in Project Management, Eric Verzuh, Wiley, 2011
7. Hidden Horizons, Dr. David Frawley and Dr. Navaratna S. Rajaram, 2006
8. Rishis, Mystics and Heroes of India, Sadhu Mukundcharandas, Swaminarayan Aksharpath, 2011
9. Power of Habit, Charles Duhigg, Random House Trade Paperbacks, 2014
10. Change Your Habit, Change Your Life, Tom Corley, North Loop Books, 2016
11. Rich Dad Poor Dad, Robert Kiyosaki, Plata Publishing, 2017
12. The Warren Buffett Way, Robert Hagstrom, Wiley, 2013
13. "What Makes a Good Life? Lessons from the Longest Study on Happiness", R. Waldinger, Ted Talks, 2015
14. Long Walk To Freedom, Nelson Mandela, Back Bay Books, 1995
15. The 17 Indisputable Laws of Teamwork, John Maxwell, HarperCollins, 2013
16. Team of Teams: New Rules of Engagement for a Complex World, Stanley McChrystal, Portfolio, 2015





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Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	-	-	-	-	-	3	-	2	2	2	1	1	-	-
CO-2	-	-	-	-	-	3	-	3	1	2	1	1	-	-
CO-3	-	-	-	-	-	2	-	3	-	1	-	-	-	-
CO-4	-	-	-	-	-	3	-	2	1	1	-	-	-	-
CO-5	-	-	-	-	-	2	-	1	-	-	1	-	-	-
CO-6	-	-	-	-	-	-	-	-	-	3	-	1	-	-



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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program: Bachelor of Engineering**

**Subject / Branch: Civil Engineering**

**Year :4<sup>th</sup>**

**Semester :VII**

**Course title :** Metro Systems & Engineering

**Course code :** FEB170002

**Course type :** Open Elective Courses

**Course credit :** 03

**Pre-requisite :** Nil

**Rationale :** Nil

**Teaching Examination Scheme:**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	0	3	3	70	30	00	00	100

**Course Objective:**

4. To enable learn about Metro Planning and Construction
5. To enable learn about Transportation Engineering

**Course Outcome:**

After learning the course the students should be able to:

1. Know about metro track components, their materials, size, function and importance
2. Routing studies; Basic Planning and Financials
3. Importance of tunnel in metro system
4. Concepts of traffic integration, multimodal transfers and pedestrian facilities.
5. Signaling systems; Automatic fare collection; Operation Control Centre (OCC and BCC);SCADA and other control systems; Platform Screen Doors.



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## Content

Unit	Description in detail	Total Hrs	Weightage
I	<b>General:</b> Overview of Metro Systems; Need for Metros; Routing studies; Basic Planning and Financials	03	6%
II	<b>Civil Engineering</b> Overview and construction methods for: Elevated and underground Stations; Viaduct spans and bridges; Underground tunnels; Depots; Commercial and Service buildings. Initial Surveys & Investigations	15	32%
III	<b>Basics of Construction Planning &amp; Management,</b> Construction Quality & Safety Systems; Traffic integration, multimodal transfers and pedestrian facilities; Environmental and social safeguards; Track systems-permanent way.	15	32%
IV	<b>Facilities Management</b> Electronics and Communication Engineering; Signaling systems; Automatic fare collection; Operation Control Centre (OCC and BCC); control systems; Platform Screen Doors	05	15%
V	<b>Mechanical &amp; TV + AC:</b> Rolling stock, vehicle dynamics and structure; Tunnel Ventilation systems; Air conditioning for stations and buildings; Fire control systems; Lifts and Escalators.	05	15%

### Reference Books :

1. S.C. Rangwala, K.S. Rangwala and P.S. Rangwala, Principles of Railway Engineering, 1964; Charotar Publishing House, Anand.
2. S.P. Bindra, Principles and Practice of Bridge Engineering, Dhanpat Rai & Sons, New Delhi
3. S.C. Saxena, Tunnel Engineering, Dhanpat Rai & Sons, New Delhi 6. D.J. Victor, Essential of Bridge Engineering, Oxford & IBH Pub. Co. Ltd. Mumbai
4. Dr. S. K. Khanna, M.G.Arora and S.S. Jain, Airport Planning & Design, Nem Chand & Bros., Roorkee
5. G.V. Rao Airport Engineering, Tata McGraw Hill Pub. Co., New Delhi
6. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, CharotarPub.House, Anand
7. S. P. Bindra, A Course in Docks and Harbour Engineering, 1992, DhanpatRai& Sons, NewDelhi
8. Highway Engineering; 2001; Author: Khanna S. K. and Justo C. E.G. Publisher: Nemchand and Brother





9. Dr. H. R. Varia, Dr. P. J. Gundaliya, Ujjaval Solanki; Urban Transportation Engineering; 2017; Mahajan Publishing House

**Online Resources :**

[www.studocu.com](http://www.studocu.com)

[www.goseeko.com](http://www.goseeko.com)

**Practical / Activities:**

Metro Site Visit

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	1	1	1	1	1	3	2	3	1	1	1	3	2	2
CO-2	3	3	3	2	3	2	3	3	2	2	1	3	1	1
CO-3	3	3	2	3	2	1	2	3	1	2	1	2	2	1
CO-4	2	3	2	2	3	2	3	3	2	3	2	2	1	1
CO-5	1	2	2	1	3	3	2	3	1	3	1	3	1	1







## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program :** Bachelor of Civil Engineering

**Subject / Branch :** Civil

**Year :** 4<sup>th</sup>

**Semester:** 7<sup>th</sup>

**Course title :** Professional Practice & Valuation

**Course code :** FEB170101

**Course type :** Professional Core Course

**Course credit :** 04

**Pre-requisite :** Civil Engineering Drawing, Construction and Construction Equipments

**Rationale :** A Civil Engineer is supposed to find out  
1) Estimated cost of a proposed structure.  
2) The value of the existing structure.  
3) Rates of items of civil engineering works

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	Pr	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	2	5	4	70	30	30	20	150

#### Course Objective:

- The Course emphasizes on advancement in the different types of estimates made in civil work.
- The complete details about rate analysis together with respective types of public works account will be explained rigorously.
- After completion of course student will able to understand.



### Course Outcome:

After learning the course the students should be able to:

1. Work out (i) the estimated cost of any proposed civil engineering structure and (ii) The value of any old structure
2. Apply the software for working out quantities of items of civil works
3. Prepare rate analysis, specifications, tenders and contract of different civil work.
4. Prepare approximate and detailed estimate of a civil engineering work.
5. Solve examples on valuation of properties/ buildings.

### Content

Unit	Description in detail	Credit	Weightage
I	<b>Computation of areas and volumes:</b> (i) Cylinder- Area of curved surface and volume (ii) Cone- Volume and area of curved surface (iii) Frustum of cone- Volume and curved surface area (iv) Frustum of pyramid- Volume and surface area of all sides. (v) Area of sector and segment of a circle (vi) Area and volume of sphere and segment of sphere (vii) Ellipse- Area of ellipse and Units of measurements	04	10
II	<b>Estimates:</b> Estimates- Definition, Units of measurements, types of estimates, Different methods to find the quantities of civil works. Estimated cost and its importance. Provisions of IS-1200, for working out quantities and deductions in civil works. Entering the measurements in quantity sheet and calculation of quantities of various items of civil works for residential, commercial and industrial buildings, Market rates of material and labour, Introduction to schedule of rates, Entering quantities and rates in abstract sheet, calculation of estimated cost.	10	25
III	<b>Specifications:</b> Definition, importance of specification, Types of specification, Care to be taken while drafting specifications, Drafting general specifications, and detailed specifications for various civil work items. <b>Rate Analysis:</b>	10	25





	Definition of rate analysis, Definition of task, Determination of man power and material requirement for a given quantity of items of civil works, study of present wages of labour and prices of material in the market. Study of market rents of different construction equipments, Determination of rate of item of civil work. Working out rates of various items of civil works like 10m <sup>2</sup> plaster, 10 m <sup>3</sup> 1:2:4 plain and reinforced concrete, 10m <sup>3</sup> brick work etc.		
IV	<b>Contract</b> Definition, legal requirements of a valid contract, types of contracts, conditions of contract, sub contracts and contractual disputes, Arbitration. <b>Tender and Tender notice:</b> Bidding process, Prequalification process, tender notice and its essential features, drafting tender notice, Bid submission, Analysis of tenders, Basis for evaluation and acceptance, letter of intent, work order, agreement.	08	20
V	<b>Valuation:</b> Definitions of value, price and cost, depreciation, sinking fund, different type of values and their significance, factor affecting value, rent and standard rent, Years purchase, valuation tables, Easement, types of easements, significance of easement in valuation, Methods of valuation of buildings and land, Estimation of values of different types of buildings and lands.	10	20

**Reference Books :**

1. B. N. Dutta, Estimation and Costing In Civil Engineering, Ubs Publishers Distributors, Ltd.
2. S. C. Rangwala, Estimating and Costing, Charotar Publishing House.
3. G. S. Birdi, Textbook of Estimating & Costing, Dhanpat Rai and Sons, Delhi.
4. M. Chakraborti, Estimating, Costing, Specification and Valuation.
5. P.W.D. Handbook and SOR, IS Code – 1200.
6. A. S. Kotadia, Professional Practice and Valuation, Mahajan Publications.
7. S. C. Rangwala, Valuation of Real Properties, Charotar Publication.



**Online Resources :**

npTEL.ac.in/

**Practical / Activities :**

1. Work out quantities of various items of civil works from working drawings of residential, industrial and commercial buildings.
2. Work out quantities of various items of civil works from drawings of culverts, L/s and C/s of Highways, etc.
3. To work out rates of items of civil works
4. Examples on valuation of land and buildings.
5. Drafting specifications for various items of civil works.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	2	1	-	-	1	1	-	-	-	-	3	2
CO-2	2	2	-	1	3	-	-	-	-	-	-	-	2	-
CO-3	3	3	2	-	-	2	-	3	-	2	-	-	3	3
CO-4	3	3	2	-	-	-	-	-	-	-	-	-	2	-
CO-5	3	3	3	1	-	-	-	2	-	-	-	-	3	2





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**Faculty of Engineering**

**Program :** Bachelor of Engineering

**Subject / Branch :** Civil Engineering

**Year :** 4th

**Semester :** 7th

**Course title :** Structural Design - I

**Course code :** FEB170102

**Course type :** Professional Core Courses

**Course credit :** 05

**Pre-requisite** Mechanics of Solid, Structural Analysis-I.

**Rationale** : This subject is applications of structural engineering principles to design basic structural elements using of reinforced concrete and steel concrete as materials. This subject is specifically aim to develop understanding of various design philosophy, Indian codal provisions, design basis used in design of basic elements of framed structures and its detailing requirement.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
4	0	2	6	5	70	30	30	20	150

Note: IS:456(2000), IS:800 (2007), Steel table are permitted in the examination

**Course Objective:**

- To develop an understanding for implementation of designing concept in the field of structural engineering.
- To present fundamental principles and methodologies of design of reinforced concrete and steel structures.
- To be able to Identify and interpret the appropriate Indian design codes.



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- To have the ability to identify different types of loads in various structures member for design.
- To be able to perceive analysis and design of components of reinforced concrete and steel structures

**Course Outcome :**

After learning the course, the students should be able to:

1. Understand various design philosophy to be used in the design of structural elements.
2. Design basic structural elements like slab, beams, columns and foundation etc. using steel and concrete as materials
3. Design basic structural beams and columns using limit state approach.
4. Design a slab using limit state approach.
5. Design foundation using limit state approach.

**Content**

Unit	Description in detail	Total Hrs	Weightage
I	<b>Introduction</b> Objectives, Properties of Reinforced Concrete and Structural Steel, Loads & load combinations, Methods of Analysis, Codes & specifications, Design Philosophies - Working stress Method, Ultimate Load Method, Limit State Method, Plastic Method	04	10%
II	<b>Limit state design of RC structural Element</b> Philosophy of Limit state design for RC structures Limit state of collapse & serviceability, partial safety factors for material & loading. Limit State of Flexure: Stress-strain characteristics of concrete & reinforcing steel, Type of section-under reinforced, over reinforced & balance section, Neutral Axis depth, Moment of Resistance for singly reinforced, doubly reinforced and flanged sections. Limit state of Axial, Shear and Torsion, combined flexure & torsion, Bond & Anchorage, Development length, splicing	06	15%
III	<b>Design of Structural element</b> Design of Beams: Simply supported, cantilever and continuous beams Design of Slab: One way, two way simply supported and continuous slabs Design of Column: Classifications, Assumptions, Design of Short Columns under axial load. Design of Foundations: Design of isolated footing under axial load and uni-axial bending, combined footing	20	35%





IV	<p><b>Limit State design of Steel elements: Philosophy of Limit state design:</b> Limit state of collapse &amp; serviceability, partial safety factor for material and loading, Type &amp; behavior of sections – Plastic, compact, semi-compact, slender</p> <p><b>Connections:</b> Bolted connections – bearing type, behavior of bolted joints, Design strength of ordinary &amp; HSTG bolts. Welded connections-Fillet and Butt weld, design of simple connections such as lap and butt joints, truss joint connections</p> <p><b>Axial force design:</b> Tension member: types of tension member, behavior, modes of failure, Design of tension member, splices, lug angle. Compression member: Behaviour, classification of sections, possible modes of failure, elastic buckling of slender member, design of compression member having single &amp; built-up section, lacing &amp; battening,</p>	16	25%
V	<p><b>Design for Beams and Beam-Columns:</b> Type of sections, classification, Lateral stability, Design strength of laterally restrained and unrestrained beams, shear strength, deflection, web buckling &amp; crippling, Design of simply supported beam. Combined axial and flexural design of member (Beam-Column)</p> <p><b>Footing :</b> slab based, gusseted base foundation</p>	10	20%

**Reference Books : (RCC)**

1. Shah & Karve; Limit State Theory & Design of Reinforced Concrete; Structure Pub., Pune
2. Dr. H.J. Shah; Reinforced concrete Vol-I; Charotar Pub. Anand
3. Punmia B.C “Advanced RCC Design” Laxmi Publications Pvt. Ltd”. 2006.
4. A.K.Jain; Design of Concrete Structures, Nemchand Publication
5. IS: 456 - Code of practice for plain and reinforced concrete
6. IS: 875 (Part I to V) - Code of practice for structural safety of Buildings Loading standards
7. IS: 1893 - Criteria for earthquake resistant design of structures
8. IS: 13920 -Code of Practice for ductile detailing of RC structure subjected to seismic force

**Reference Books (Steel Design)**

1. N.Subramanian; Steel Structures, Oxford Publication
2. Arya A.S. & Ajmani J.L.; Design of Steel Structures; Nemchand & Bros., Roorkee
3. Dayaratnam P.; Design of Steel Structures; Wheelor pub. co., Delhi
4. Ramamrutham S. & Narayanan R.; Design of Steel Structures; Dhanpatrai & Sons, Delhi
5. K. S. Sai Ram; Design of Steel Structures, Pearson
6. IS: 800 – 2007, Code of practice for General Construction in steel
7. IS: 875 - (Part I to V) - Code of practice for structural safety of building loading standards
8. IS: 226 - Structural steel (Standard Quality)
9. SP: 6(1) - Structural steel section
10. SP: 6(6) - Application of plastic theory in design





**Online Resources :**

1. <http://elearning.vtu.ac.in/>
2. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

**Practical / Activities :**

1. Design, casting and testing of under reinforced and over reinforced beam.
2. Design and testing of steel beam section.
3. Prepare model of various connections/elements in steel structures.
4. Prepare model showing reinforcement detail of singly reinforced, doubly reinforced simply supported and continuous beams.
5. Prepare model showing reinforcement detail of one way and two way slabs with various end conditions.
6. Prepare model for detailing of beam column junction and column-footing junction

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	3	-	-	-	-	-	1	-	2	-	2	2
CO-2	3	3	3	2	-	-	-	-	1	-	-	-	2	-
CO-3	3	3	3	1	-	-	-	-	1	-	-	-	2	-
CO-4	3	2	3	1	2	-	-	-	1	-	-	-	2	1
CO-5	2	2	2	1	2	1	-	-	1	-	-	-	2	1





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program:** Bachelor of Civil Engineering

**Subject / Branch :** Civil

**Year :** 4<sup>th</sup>

**Semester:** 7<sup>th</sup>

**Course title :** Earthquake Engineering

**Course code :** FEB170103

**Course type :** Professional Elective Courses

**Course credit :** 03

**Pre-requisite :** Mechanics of Solids, Structural Analysis I&II, Design of Reinforced Concrete Structure.

**Rationale:** This subject is conceptual applications of principles of dynamics and earthquake resistant design & detailing of RC structures. Some special topics like Earthquake resistant masonry structures, liquefaction, structural controls and seismic strengthening are included aiming students know that these are challenges in this subject. This subject is useful to understand the behavior of the structure subjected to earthquake forces and earthquake resistant design of the structure.

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	Pr	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150

#### Course Objective:

- The Earthquake Studies Program aims to foster interdisciplinary teaching and research related to natural, man-made and technological disasters
- Design, construct and maintain structures to perform at earthquake exposure up to the expectations and in compliance with building codes.





**Course Outcome:**

After learning the course the students should be able to:

1. Determine the response of SDOF & MDOF structural system subjected to vibration including earthquake.
2. Apply the concept of Earthquake Resistant Design & concept of lateral load distribution on buildings.
3. Determine the lateral forces generated in the structure due to earthquake.
4. Apply the concept of ductile detailing in RC structures.

**Content**

Unit	Description in detail	Credit	Weightage
I	<b>Earthquake Basics:</b> Interior of Earth, plate tectonics, faults, consequences of earthquake, Basic parameters of earthquake, magnitude & intensity, scales, Seismic zones of India, damages caused during past earthquakes (worldwide).	03	12%
II	<b>Design Philosophy:</b> Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), seismic structural provisions. Configuration, Introduction to IS: 1893 (Part I), IS: 875 (Part V). Seismic load: <b>Seismic Coefficient Method</b> – base shear and its distribution along height. Introduction to Response spectrum, IS code	10	38%
III	<b>Lateral Loads on Buildings:</b> <b>Lateral Load Distribution (SDOF):</b> Rigid diaphragm effect, centers of mass and stiffness, torsionally coupled and uncoupled system. <b>Lateral Load Analysis:</b> Analysis of frames using approximate methods like portal & cantilever methods	06	19%
IV	<b>Ductile Detailing:</b> Concepts of Detailing of various structural components as per IS: 13920 provisions.	03	12%
V	<b>Special topics:</b> Introduction to Earthquake Resistant Features of un-reinforced & reinforced masonry Structure, Confined Masonry, Soil liquefaction, Structural controls, Seismic strengthening.	06	19%





### Reference Books :

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
3. K Subramanya, Water Resources Engineering through Objective Questions, Tata Mc-Graw Hill.
4. G L Asawa, Irrigation Engineering, Wiley Eastern
5. L W Mays, Water Resources Engineering, Wiley.
6. J D Zimmerman, Irrigation, John Wiley & Sons
7. C S P Ojha, R Berndtsson and P Bhunya, Engineering Hydrology, Oxford.

### Online Resources :

1. [www.nicee.org](http://www.nicee.org)
2. [www.eeri.org](http://www.eeri.org)
3. [www.gsdma.org](http://www.gsdma.org)
4. [www.ndma.gov.in](http://www.ndma.gov.in)
5. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)
6. [www.nisee.berkeley.edu/elibrary/getpkg?id=NONLI](http://www.nisee.berkeley.edu/elibrary/getpkg?id=NONLI)

### Practical / Activities :

Following experiments should be carried out in laboratory.

1. Spring Mass model
2. Mode shapes of three storey building
3. Response of structure with & without Shear wall and bracing system
4. Response of building with re-entrant corner
5. Behaviour of structure under pounding
6. (a) Liquefaction potential of clayey & sandy soil (b) Response of structure with isolated, raft & pile foundation under liquefaction

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	2	-	-	-	-	1	-	-	-	-	2	-
CO-2	3	3	3	1	-	-	-	-	-	-	-	-	1	-
CO-3	3	3	2	2	-	-	-	1	-	-	-	-	1	-
CO-4	2	3	3	-	-	-	-	2	-	-	-	-	1	-



**GOKUL  
GLOBAL  
UNIVERSITY**

Approved By Govt. of Gujarat  
(Recognized by UGC under Section 22 & 2(f) of 1956)  
(Gujarat Private State University Act 4 of 2018)



## Gokul Global University, Sidhpur.

Faculty of Engineering



**Program:** Bachelor of Civil Engineering

**Subject / Branch :** Civil

**Year :** 4<sup>th</sup>

**Semester:** 7<sup>th</sup>

**Course title :** URBAN TRANSPORTATION  
PLANNING

**Course code :** FEB170104

**Course type :** Professional Elective Courses

**Course credit :** 03

**Pre-requisite :** Knowledge of Road Transportation

**Rationale:** Due to rapid urbanization, population and number of vehicles are increased very fast in urban areas. Sprawl in urban area necessitates efficient road/railway network and reliable mass transportation systems to cater the increased need of the passengers and goods trips within urban as well as suburban area. Safe, economic, timely and comfortable urban mass transportation systems reduce private vehicle trips, which ultimately reduce traffic congestion, accidents and environmental pollution. Study of this subject imparts knowledge of urbanization process, urban transportation system planning, land use planning, travel demand modeling procedure, different urban mass transportation systems and urban goods movement.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	Pr	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150



Faculty of Engineering  
**Hansaba College of Engineering & Technology**



University Campus, State Highway-41, Siddhpur - 384151, Dist. Patan, Gujarat, INDIA  
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**Course Objective:**

- students will understand and be able to apply travel demand molding, project development and financing, regulations and policies, environmental related issues, land use and contemporary issues in transportation planning.

**Course Outcome:**

After learning the course the students should be able to:

1. Know about urban transportation system planning process, land use planning, different urban mass transit systems-their merits and limitations, different types of transportation surveys, travel demand modeling, urban mass transit system operation and urban goods movement.
2. Carry out trip generation, trip distribution, modal split and trip assignment analysis.
3. Develop and calibrate trip generation rates for specific types of land use developments.
4. Learn the federal legislation and planning regulations pertaining to transportation planning issues
5. Understated selected emerging contemporary transportation issues and their impact on the society

**Content**

Unit	Description in detail	Credit	Weightage
I	<b>INTRODUCTION:</b> Development plans, objectives and goals; level of planning; role of transportation at national, regional and urban level. <b>URBANISATION:</b> Definition of urban area; trends in urbanization; urban class groups; metropolitan city; transportation problems & identification. <b>TRAVEL DEMAND:</b> Concepts of travel demand; factors affecting demand and the demand functions; calibration methods; sequential, direct demand models; introduction to aggregate and disaggregate approaches.	<b>08</b>	<b>20%</b>
II	<b>TRANSPORTATION SURVEYS:</b> The transportation study area definition; division into traffic zones; network identification and coding; types of travel and characteristics of various surveys; home interview; roadside survey; goods, mass transit and intermediate public transport surveys; sampling and expansion factors; accuracy checks, screen line checks, consistency checks.	<b>14</b>	<b>30%</b>





	<b>TRAVEL FORECASTING:</b> Growth factor methods and urban transportation planning system; growth factors; average growth factor method and Furness method.		
III	<b>UTP SYSTEM :</b> Trip generation; zonal regression methods and category analysis; trip distribution method; gravity models and opportunity models; mode split methods; factors affecting modal split; trip end models and trip distribution models; route assignment; factors affecting route choice; diversion curve; shortest paths; all or nothing assignment.	<b>10</b>	<b>20%</b>
IV	<b>CORRIDOR IDENTIFICATION:</b> Prediction issues and forecasting of the travel demand and future desires; corridor identification and corridor screen line analysis.	<b>5</b>	<b>8%</b>
V	<b>TRANSPORTATION PLAN PREPARATION:</b> Urban forms and structures; point, linear, radial, poly-nuclear developments and preparation of plan; comprehensive and traffic system management plans.	<b>5</b>	<b>7%</b>

#### Reference Books :

1. B.G.Hutchinson, Principles of urban transportation system planning- McGraw-Hill, New York, 1974
2. Edward K.Morlok, Transportation Engg. and Planning
3. W.Dickey, Metropolitan Transportation Planning Tata McGraw-Hill, New Delhi, 1975
4. Blunder and Black, Land use Transportation System
5. J.Ortuzer and L.G. Willumsen, Modelling Transport, Johan Wiley and Sons Chincester,1994
6. Vukan R. Vuchic, Urban Transit : Operations, Planning and Economics, Wiley Sons Publishers.
7. Peter White, Public Transport, UCL Press
8. Kadiyali L.R., Traffic Engineering and Transport Planning, Khanna Publishers
9. Khisty, C J., Transportation Engineering – An Introduction, Prentice-Hall, NJ
- 10.S.C. Saxena, Traffic Planning and Design, Dhanpat Rai Pub., New Delhi.
- 11.Partho Chakraborty and Animesh Das, Principles of Transportation Engineering, PHI
- 12.C. S. Papacostas, Fundamentals of Transportation System Analysis, PHI.
- 13.James H. Banks, Introduction to Transportation Engineering, WCB-McGraw Hill, New York





**Online Resources :**

1. <https://www.acbconsultingservices.com/construction-management-for-transportation/what-is-urban-transportation-planning/>
2. <https://onlinepubs.trb.org/Onlinepubs/hrr/1970/309/309-003.pdf>

**Practical / Activities :**

1. Classified Volume Count Survey by manual and mechanical method.
2. Spot speed study by manual and Enoscope method.
3. Turning movement study at Intersection.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	-	2	-	-	-	-	2	-	-	2	3	3
CO-2	3	3	-	2	-	-	2	-	2	-	-	-	2	3
CO-3	3	3	3	2	-	-	2	-	2	-	-	-	2	2
CO-4	3	2	2	1	-	2	-	-	2	-	-	-	-	2
CO-5	3	2	2	1	-	3	-	-	1	-	-	-	-	1







## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program:** Bachelor of Civil Engineering

**Subject / Branch:** Civil

**Year :** 4<sup>th</sup>

**Semester:**7<sup>th</sup>

**Course title :** PROJECT - I

**Course code :** FEB170105

**Course type :** Professional Elective Courses

**Course credit :** 03

**Pre-requisite :** Nil

**Rationale:** This is a laboratory oriented subject focusing on enhancing practical, design, presentation and project management skills required for Power Electronics. This is based on the topics/subjects already covered in previous semesters and subjects of current semester

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
0	0	8	8	4	00	00	80	20	100

#### Course Objectives :

1. To generate awareness regarding relating the theory to the real life challenges pertaining to the civil engineering field.
2. To provide a realistic platform to the students where, they understand the process of addressing the field issues, core knowledge application methods and ways of solutions for the problems.
3. To facilitate the user oriented problem solving attitude amongst the students and make use of their inter-personal skills along with the learning from the theory for a safer and sustainable development of the infrastructural facilities for the society.



- To make the students learn how to correlate the industry, field, institution and the stake holders of each level through the project initialization and completion.

### Course Outcomes:

After studying this subject student will be able to:

- Apply the theoretical knowledge to solve industrial/social problem.
- Understand, analyze and solve Medium/Large scale engineering field problems
- Demonstrate teamwork and leadership qualities.
- Design a solution with sustainability and professional ethical conduct as per field expectations

### Content

Sr.	Content
1	Students have to carry out project work at different Industrial organizations, in connection with the subjects they are studying in Civil Engineering. Course. This Project work of 2 weeks will be under guidance of Industrial guide and Institutional guide (faculty). After completion of Project, the students have to prepare detailed project report and presentation will be done by them at the institute. During project work the Institutional guide (faculty) will visit once the place of project to guide, evaluate the student and give necessary instructions for corrections.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	-	-	2	-	-	-	-	-	-	-	2	-	2
CO-2	3	3	-	3	3	-	-	-	-	-	-	-	1	-
CO-3	2	3	2	2	2	-	-	-	-	-	-	-	-	1
CO-4	3	-	3	-	-	2	2	-	-	-	-	-	2	-



## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program:** Bachelor of Civil Engineering

**Subject / Branch:** Civil

**Year** : 4<sup>TH</sup>

**Semester:** 8<sup>th</sup>

**Course title** : Construction Management & Equipment's

**Course code** : FEB180101

**Course type** : Professional Core Course

**Course credit** : 04

**Pre-requisite** : Elements of construction planning, project cost, safety, economy, quality.

**Rationale** : Any construction project should be completed within budget and time frame ensuring safety and quality at its best.

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	Pr	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
3	0	2	5	4	70	30	30	20	150

#### Course Objective:

1. Construction management programmes help professionals understand the different stages of construction.
2. Such courses can help you learn different aspects of engineering, materials, science and mathematics that help ensure efficiency, safety, quality and cost-effectiveness in construction projects.





**Course Outcome:**

After learning the course the students should be able to

1. Execute all type of managerial tasks in construction projects.
2. Use software for construction projects management.
3. Student can demonstrate an ability to develop the various components of project controls including planning, scheduling, cost and resource management
4. Students will be able to demonstrate planning, scheduling and monitoring of projects using professional software.
5. Derive evaluation criteria and attributes for Construction Projects

**Content**

Unit	Description in detail	Credit	Weightage
I	<b>Introduction to Construction Management:</b> A construction project, Phases of construction project, Importance of construction and construction industry, Indian construction industry need of construction management, Stakeholders of construction management. <b>Construction Planning:</b> Types of project plans, Work break down structure, Planning techniques: Bar charts, CPM and PERT network analysis, ladder network, Line of balance method.	11	27%
II	<b>Resource Allocation &amp; Leveling</b> Resource allocation, Importance of project scheduling, Deriving other schedules, Network crashing and cost time trade off. <b>Construction Material Management:</b> Material management functions, Inventory management. Job layout <b>Construction Project Value Managements</b> Value management in construction, Steps, Value engineering application in a typical case project.	06	15%
III	<b>Construction Quality Management:</b> Construction quality, Inspection, Quality control and Quality assurance in projects, Total quality management, Quality gurus and their teaching cost of quality ISO standards, Principles of quality management systems, (CONQUAS) construction quality assessment system	05	10%
IV	<b>Construction Safety Management:</b> Evolution of safety, Accident causation theory, Unsafe conditions, Unsafe acts health and safety act and regulation cost of accidents, Role of safety personnel, Accident causes and principles of safety,	04	08%





	Safety and health management system.		
V	<b>Construction Equipments:</b> <b>A) Excavating equipments</b> Selection, basic parts, operation, factors affecting output • Tractors and related equipment: Bulldozers, Rippers, Scrapers • Excavating Equipment: Power shovels, Draglines, Hoes, Clam • Shells and trenching machines.  <b>B) Hauling and conveying equipments</b> •Hauling and lifting equipment: Trucks, wagons, cranes etc. •Belt conveyor system: Terminology, Classification, Components, Power requirement estimation and design.	16	40%

**Reference Books :**

1. Sharma, M.R., Fundamentals of Construction Planning and Management, S.K. Kataria & Son, New Delhi, 2012
2. Seetharaman, S., Construction Engineering & Management, Umesh Publications, 2007.
3. Srinath, L.S., PERT & CPM Principles and Applications, Tata McGraw Hill, New Delhi.
4. Peurifoy, L., Schexnayder, C.J. and Shapira, A., Construction Planning, Equipment and Methods, McGraw Hill, New Delhi, 8th Edition, 2010.
5. Punamia, B.C. and Khandelwal, K.K., Project Planning and Control with PERT and CPM, Laxmi Publications, New Delhi, 2004.
6. Gahlot, P.S. and Dhir, B.M., Construction Planning & Management, New Age International (P) Ltd., New Delhi
7. Chitkara, K. K., Construction Project Management Planning, Scheduling and Controlling, Tata McGraw Hill, New Delhi.

**Online Resources :**

[http://en.wikipedia.org/wiki/Construction\\_Management\\_&Equipments](http://en.wikipedia.org/wiki/Construction_Management_&Equipments)

**Practical / Tutorial:**

1. Work breakdown structure (WBS)
2. Development of Activity logical Relations
3. Bar charts
4. CPM network developments (AOA & AON)
5. CPM network analysis (Event times/activity times/floats)







6. PERT network analysis
7. Project updating
8. Project crashing (Time-Cost optimization)
9. Mathematical Modeling
10. Graphical Method for Optimum Solution
11. Simplex Method for Optimum Solution
12. Earned Value Analysis
13. Software Based Project (To be issued at the beginning and to be developed throughout)

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	1	1	1	-	-	-	2	2	-	3	-	2	2
CO-2	2	1	1	-	3	-	-	-	-	-	3	-	2	2
CO-3	3	2	2	-	-	-	-	2	2	-	2	-	3	2
CO-4	2	1	2	-	3	-	-	2	1	-	2	-	2	2
CO-5	3	1	2	-	-	-	-	-	-	-	-	-	2	-





## Gokul Global University, Sidhpur.

### Faculty of Engineering



**Program** : Bachelor of Engineering

**Subject / Branch** : Civil Engineering

**Year** : 4th

**Semester** : VIII

**Course title** : Structure Design - II

**Course code** : FEB180102

**Course type** : Core

**Course credit** : 05

**Pre-requisite** : Mechanics of Solids, Structural Analysis-I,II, Structural Design- I.

**Rationale** : This subject is applications of structural engineering principles to design basic structural elements using of reinforced concrete and steel concrete as materials. This subject is specifically aim to develop understanding of various design philosophy, Indian codal provisions, design basis used in design of basic elements of framed structures and its detailing requirement

#### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
4	0	2	6	5	70	30	30	20	150

#### Course Objective :

Be able to design G+3 concrete building, Retaining wall, water tank and Flat Slab, foot over bridge , plate girder and industrial building design.

#### Course Outcome :

After learning the course the students should be able to:

1. Understand various design philosophy to be used in the design of structural elements.
2. Assess loads, prepare layout, analyse, design and detail of various structural elements for RC framed structure up to G+3.
3. Design & detail RC structures like Retaining Wall, Water Tank and Flat slab.
4. Prepare structural layout of Industrial steel structures, plate girder, foot-over bridge.





5. Determine the loads acting on it and identify the typical failure modes.
6. Apply the principles, procedures and current Indian codal provisions to the analysis and design of Industrial structures, plate girder & foot-over bridges.
7. Apply the principles of plastic design in steel beams & portal frames.

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>RC Design</b> <b>Building Layout and Design:</b> Loads as per I.S., distribution &amp; flow of loads, lateral load due to wind and seismic as per latest IS standards, load combinations, guide lines for preparation of structural layout for building. Analysis, design &amp; detailing of G + 3 RC framed building for residential /commercial purpose including ductile detailing.</p>	10	15%
II	<p><b>Design of Retaining wall:</b> Types, behavior and application of retaining wall, stability criteria, design &amp; detailing of cantilever &amp; counterfort type retaining wall for various ground conditions <b>Design of Flat Slab:</b> Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way and two way shears, Limitations of Direct design method, Introduction to Equivalent frame method.</p>	10	20%
III	<p><b>Design of Water Tank:</b> Classification of water tank and method of analysis, permissible stresses, codal provisions, Design of circular and rectangular under-ground water tanks using IS code method, Design of elevated water tank with Intze type of container, frame and shaft type of staging and foundation considering effect of earthquake and wind forces</p>	08	15%
IV	<p><b>Loads &amp; Load Combinations:</b> Appraisal of loading standards such as I.S, I.R.C., Effect of wind and earthquake on structure. <b>Design of plate girders:</b> Modes of failure : Elastic buckling, Bending in the plane of web, Local buckling, Buckling in the plane of web, Vertical buckling of the compression flange, Shear buckling Design of bolted, welded plate girder by Tension field Method &amp; Simple Post Critical Method including design of vertical &amp; horizontal stiffeners, Splices, Curtailment</p>	15	25%





V	<b>Design of Industrial Building:</b> Structural layout of industrial building, Various types of trusses and their selection, effect of wind loads on purlin and trusses, bracing systems, columns, foundations, gantry girder – static and moving loads, selection & design of section. <b>Design of foot-over bridges:</b> Structural system of through & deck type bridges, design of foot-over bridge & its Supporting system.	15	25%
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### Reference Books :(RCC)

1. Shah & Karve; Limit State Theory & Design of Reinforced Concrete; Structure Pub., Pune
2. Dr. H.J. Shah; Reinforced concrete Vol-I; Charotar Pub. Anand
3. Punmia B.C “Advanced RCC Design” Laxmi Publications Pvt. Ltd”. 2006.
4. A.K.Jain; Design of Concrete Structures, Nemchand Publication
5. IS: 456 - Code of practice for plain and reinforced concrete
6. IS: 875 (Part I to V) - Code of practice for structural safety of Buildings Loading standards
7. IS: 1893 - Criteria for earthquake resistant design of structures
8. IS: 13920 -Code of Practice for ductile detailing of RC structure subjected to seismic force

### Reference Books (Steel Design)

1. N.Subramanian; Steel Structures, Oxford Publication
2. Arya A.S. &Ajamani J.L.; Design of Steel Structures; Nemchand& Bros., Roorkee
3. Dayaratnam P.; Design of Steel Structures; Wheelor pub. co., Delhi
4. Ramamrutham S. & Narayanan R.; Design of Steel Structures; Dhanpatrai & Sons, Delhi
5. K. S. Sai Ram; Design of Steel Structures, Pearson
6. IS: 800 – 2007, Code of practice for General Construction in steel
7. IS: 875 - (Part I to V) - Code of practice for structural safety of building loading standards
8. IS: 226 - Structural steel (Standard Quality)
9. SP: 6(1) - Structural steel section
10. SP: 6(6) - Application of plastic theory in design

### Suggested Readings :

### Online Resources :

<http://elearning.vtu.ac.in/>

[www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

### Practical / Activities:

### List of tutorials

1. Building Layout and Design analysis examples.





2. Design of Retaining wall
3. Design of Water Tank
4. Design of Flat Slab
5. Loads & Load Combinations
6. Design of plate girders
7. Design of Industrial Building
8. Design of foot-over bridges

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	3	3	1	-	-	-	-	1	-	2	-	2	2
CO-2	3	3	3	2	-	-	-	-	1	-	-	-	2	-
CO-3	3	3	3	1	-	-	-	-	1	-	-	1	2	-
CO-4	3	2	3	1	2	-	-	-	1	-	-	-	2	1
CO-5	2	2	2	1	2	1	-	-	1	-	-	-	2	2
CO-6	3	2	3	1	1	-	2	-	-	-	-	-	2	2
CO-7	3	3	3	2	1	-	-	-	-	-	-	-	2	2







## Gokul Global University, Sidhpur.

Faculty of Engineering



**Program:** Bachelor of Civil Engineering

**Subject / Branch:** Civil

**Year :** 4<sup>TH</sup>

**Semester:** 8<sup>th</sup>

**Course title :** Dock Harbour And Airport Engineering

**Course code :** FEB180103

**Course type :** Professional Elective Course

**Course credit :** 03

**Pre-requisite :** Nil.

**Rationale :** Harbour and Airports are important infrastructure for economic growth of any country. It requires large scale planning, design and construction. It requires huge amount of investment. Precise engineering skill is required for the planning, design and construction and maintenance of Harbour and Airport engineering. The subject covers the fundamental knowledge of various important elements of Harbour and Airport Engineering. It includes the planning, design and construction techniques used in the Harbour and Airports.

### Teaching Examination Scheme :

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	Pr	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150

### Course Objective:

- 1) To have an overall knowledge of the design and construction of airport, docks, harbours and ports as a whole.
- 2) To understand the function of different components of airports, docks and harbours.



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**Course Outcome:**

After learning the course the students should be able to:

- 1) To understand the various elements of Harbour and Airport
- 2) To understand the fundamentals of planning and design of various marine structures
- 3) To make the students aware about the operations in Harbour
- 4) To give knowledge of maintenance techniques at Harbour
- 5) To understand the fundamentals of planning and design of Airport structures.
- 6) To make students aware of design of runway and taxiways at Airport
- 7) To make students aware of the operations at Airport

**Content**

Unit	Description in detail	Credit	Weightage
I	<p><b>HARBOUR ENGINEERING</b></p> <p><b>General:</b> History of water transportation at world level and at national level development and policy, classification of harbours, natural and artificial. Major ports in India, administrative set up.</p> <p><b>Harbour Planning:</b> Harbour components, ship characteristics, characteristics of good harbour and principles of harbour planning, size of harbour, site selection criteria and layout of harbours. Surveys to be carried out for harbor planning.</p> <p><b>Natural Phenomena:</b> Wind, waves, tides formation and currents phenomena, their generation characteristics and effects on marine structures, silting, erosion and littoral drift.</p>	07	17
II	<p><b>Marine Structures:</b> General design aspects, breakwaters - function, types general design principles, wharves, quays, jetties, piers, pier heads, dolphin, fenders, mooring accessories – function, types, suitability, design and construction features.</p>	09	14
III	<p><b>Docks and Locks:</b> Tidal basin, wet docks-purpose, design consideration, operation of lock gates and passage, repair docks - graving docks, floating docks.</p> <p><b>Port Amenities and Navigational Aids:</b> Ferry, transfer bridges, floating landing stages, transit sheds, warehouses, cold storage, aprons, cargo handling equipments, purpose and general description, Channel and entrance demarcation, buoys, beacons, light house electronic communication devices.</p> <p><b>Harbour Maintenance:</b> Costal protection-purpose and devices, dredging, purpose, methods, dredgers-types, suitability, disposal of dredged materials .mechanical and hydraulic dredgers.</p>	08	19
IV	<p><b>AIRPORT ENGINEERING</b></p> <p><b>General:</b> History, development, policy of air transport, aircrafts,</p>	12	25





	<p>aerodromes, air transport authorities, air transport activities, air crafts and its characteristics, airport classifications as per ICAO.</p> <p><b>Airport Planning:</b> Regional planning-concepts and advantages, location and planning of airport as per ICAO and F.A.A. recommendations, airport Elements -airfield, terminal area, obstructions, approach zone, zoning laws, airport capacity, airport size and site selection, estimation of future air traffic, development of new airport, requirements of an ideal airport layout.</p> <p><b>Grading and Drainage:</b> Airport grading-importance - operations, airport drainage aims, functions, special characteristics, basic requirements, surface and subsurface drainage systems.</p> <p><b>Air Traffic Control and Visual Aids:</b> Air traffic control objectives, control system, control network-visual aids-landing information system, airport markings and lighting.</p>		
V	<p><b>AIRPORT ENGINEERING</b></p> <p><b>Run Way Design:</b> Wind rose and orientation of runway ,wind coverage and crosswind component, factors affecting runway length, basic runway length, and corrections to runway length, runway geometrics and runway patterns (configurations).Runway marking, threshold limits cross section of runway</p> <p><b>Taxiway Design:</b> Controlling factors, taxiway geometric elements, layout, exit taxiway, location and geometrics, holding apron, turnaround facility. Aprons -locations, size, gate positions, aircraft parking configurations and parking systems, hanger-site selection, planning and design considerations, Fuel storage area, blast pads . wind direction indicator</p> <p><b>Terminal Area Design:</b> Terminal area elements and requirements, terminal building functions, space requirements, location planning concepts, vehicular parking area and Circulation network. passenger requirements at terminal building</p>	12	25

**Reference Books :**

1. Dr. S. K. Khanna, M.G.Arora and S.S. Jain, Airport Planning & Design, Nem Chand & Bros., Roorkee
2. G.V. Rao Airport Engineering, Tata McGraw Hill Pub. Co., New Delhi
3. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, Charotar Pub. House, Anand
4. S. P. Bindra, A Course in Docks and Harbour Engineering, 1992, Dhanpat Rai & Sons, New Delhi





5. Airport Engineering, Charotar Publishing House Pvt. Ltd, Anand

**Online Resources :**

- <http://nptel.ac.in/>

**Technical Visit:**

- 1) The visit of any harbour and port structure should be carried out to understand the various structures, its construction and operations.
- 2) The visit of Airport site should be carried out to understand the various structures, its construction and operations.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	1	1	-	-	-	-	-	-	-	-	-	2	-
CO-2	2	2	3	-	-	-	2	-	-	-	-	-	3	2
CO-3	2	1	1	-	3	-	-	-	-	-	-	-	2	-
CO-4	1	2	2	-	2	-	2	-	-	-	-	-	1	-
CO-5	2	3	3	-	2	-	2	-	-	-	-	-	3	2
CO-6	2	2	3	-	2	-	3	-	-	-	-	-	3	2
CO-7	2	1	2	-	3	-	2	-	-	-	-	-	1	-





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program** :Bachelor of Engineering

**Subject / Branch** :Civil Engineering

**Year** :4<sup>th</sup>

**Semester** :VIII

**Course title** : Irrigation Engineering

**Course code** : FEB180104

**Course type** : Professional Elective Courses

**Course credit** : 03

**Pre-requisite** :Knowledge of Fluid Mechanics, Hydrology and Water Resources Engineering

**Rationale** :To develop understanding about water requirements of crops, irrigation methods, and irrigation engineering works like weir/barrage, storage and outlet works, distribution works, regulating and cross drainage works and importance of drainage in irrigated areas.

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
2	0	2	4	3	70	30	30	20	150

**Course Objective :**

To understand the irrigation methods along with their advantages and disadvantages

To understand function of different hydraulic structure

**Course Outcome :**

After learning the course, the students should be able to:

1. Understand the irrigation methods and duty-delta relation for crops



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2. Calculate Net Irrigation Requirement (NIR), Field Irrigation Requirement (FIR) and Gross Irrigation Requirement (GIR)
3. Calculate the pressure at key points of sheet piles and floor thickness for a weir/barrage using Khosla's theory
4. Plot seepage line of earthen dam with corrections at entry and exit
5. Calculate forces on gravity dams.

### Content

Unit	Description in detail	Total Hrs	Weightage
I	<p><b>Module I:</b></p> <p><b>Introduction:</b> Definition, Necessity, Scope, Benefits and ill effects of irrigation, Types of irrigation schemes, Social and environmental considerations, Irrigation development in India.</p> <p><b>Water Requirement of Crops:</b> Soil-water-plant relation- field capacity, wilting point, available water, consumptive use, Irrigation Requirements – Net irrigation requirement, Field irrigation requirement, Gross Irrigation requirement, Soil moisture extraction pattern, Frequency of irrigation, Principal Indian crops, Gross Commanded area, Culturable command area, Intensity of irrigation Duty and delta relation, Introduction to various methods of application of irrigation water, Irrigation Efficiency, assessment of irrigation water.</p>	10	25%
II	<p><b>Module 2</b></p> <p><b>Diversion Works:</b> Different stages of a river and their flow characteristics, Weir and barrages, Various parts of a weir and their functions, Exit gradient, Principles of weir design on permeable formations -Bligh's creep theory and Khosla's theory</p> <p><b>Storage and Outlet works:</b> Types of earthen dams, Seepage in earth dams, Gravity dams, Forces Acting on a gravity dam, Rock-fill dams, Spillways, Types of spillways, Spillways gates and energy dissipation works.</p>	10	25%
III	<p><b>Module 3</b></p> <p><b>Distribution works:</b> Modes of conveying irrigation water- Types of irrigation canals contour canal, ridge canal, side sloping canals, Canal sections-fillingcutting, partial cutting and partial filling, Balanced depth, Canal FSL, Capacity factor and Time factor, L-section, Losses of canal water, Silting and scouring of canals, Method of design of unlined section of irrigation canal, Silt theories, Lined canals, Design of lined canal, Link canals.</p>	08	20%





IV	<b>Module 4</b> <b>Regulating and Cross Drainage Works:</b> Canal falls, Cross drainage works, Types of cross drainage works, Canal escapes, Head regulator and Cross regulator, Silt ejector, Flowmeters - Parshall flume, Irrigation outlets and types of outlets.	06	20%
V	<b>Module 5</b> <b>Water logging:</b> causes, Reclamation, Drainage principles and practice	03	10%

**Reference Books :**

1. Irrigation & Water Power Engineering - Dr.B.C.Punmia&B.B.Pande, Laxmi Publications, (P) Ltd, NewDelhi
2. Irrigation, Water Resources & Water Power Engineering - Dr.P.N.Modi, Standard Book House, Delhi
3. Irrigation, Water Power & Water Resources Engineering - Dr.K.R.Arora Standard PublishersDistributors, Delhi
4. Irrigation Engineering and Hydraulic Structures - S.K.Garg, Khanna Publishers, Delhi
5. Irrigation Engineering, S.K. Mazumder, Galgotia Publications Pvt Ltd., New Delhi

**Online Resources :**

1. <http://elearning.vtu.ac.in/>
2. [www.nptel.iitm.ac.in/courses/](http://www.nptel.iitm.ac.in/courses/)

**List of Assignments:**

1. Introduction, water requirements of crops and methods of irrigation
2. Diversion Head-works
3. Storage works and Dam Outlet works
4. Distribution Works
5. Regulating and Cross Drainage Works
6. Water logging and Drainage

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	1	2	1	1	-	-	1	-	-	-	-	-	-	-
CO-2	1	-	-	1	-	1	1	-	-	-	-	-	-	-
CO-3	2	2	3	2	-	1	1	2	-	-	-	-	2	1
CO-4	3	3	3	2	-	1	1	-	-	-	-	-	1	-
CO-5	2	2	2	2	-	1	1	2	-	-	-	-	2	1





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**Gokul Global University, Sidhpur.**

**Faculty of Engineering**



**Program:** Bachelor of Civil Engineering

**Subject / Branch:** Civil

**Year :** 4<sup>th</sup>

**Semester:**8<sup>th</sup>

**Course title :** PROJECT - II

**Course code :** FEB170105

**Course type :** Professional Elective Courses

**Course credit :** 03

**Pre-requisite :** Nil

**Rationale:** This is a laboratory oriented subject focusing on enhancing practical, design, presentation and project management skills required for Power Electronics. This is based on the topics/subjects already covered in previous semesters and subjects of current semester

**Teaching Examination Scheme :**

Teaching Scheme				Credits	Examination Marks				Total Marks
Th	Tu	P	Total		Theory		Practical		
					SEE (E)	PA (M)	Viva (V)	PA (I)	
0	0	16	16	8	00	00	80	20	100

**Course Objectives :**

- To generate awareness regarding relating the theory to the real life challenges pertaining to the civil engineering field.
- To provide a realistic platform to the students where, they understand the process of addressing the field issues, core knowledge application methods and ways of solutions for the problems.
- To facilitate the user oriented problem solving attitude amongst the students and make use of their inter-personal skills along with the learning from the theory for a safer and sustainable development of the infrastructural facilities for the society.



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- To make the students learn how to correlate the industry, field, institution and the stake holders of each level through the project initialization and completion.

**Course Outcomes:**

After studying this subject student will be able to:

- Demonstrate initiative and intellectual levels to comprehend the chosen topic..
- Search for technical information from various resources, such as the library,
- Formulate engineering problems and develop appropriate solution methods.
- Understand and demonstrate the required professionalism to influence the societal change.
- Write scientific report and present their research work in a precise and coherent manner.

**Content**

Sr.	Content
1	Students have to carry out project work at different Industrial organizations, in connection with the subjects they are studying in Civil Engineering. Course. This Project work of 2 weeks will be under guidance of Industrial guide and Institutional guide (faculty). After completion of Project, the students have to prepare detailed project report and presentation will be done by them at the institute. During project work the Institutional guide (faculty) will visit once the place of project to guide, evaluate the student and give necessary instructions for corrections.

Course Outcomes	Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)													
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	-	-	2	-	-	-	-	-	-	-	2	1	-
CO-2	3	3	-	3	3	-	-	-	-	-	-	-	2	-
CO-3	2	3	2	2	2	-	-	-	-	-	-	-	1	-
CO-4	3	-	3	-	-	2	2	-	-	-	-	-	-	1
CO-5	3	2	-	-	2	-	-	-	2	2	-	2	2	-

