

**Course Structure**  
Bachelor of Technology  
**Civil Engineering (CE)**

**I YEAR – I SEMESTER**

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	18HS0848	Physics	3	1	-	4
2	18HS0830	Mathematics – I	3	-	-	3
3	18CS0501	Programming for Problem Solving	3	-	-	3
4	18CE0101	Engineering Mechanics	2	1	-	3
5	18HS0852	Physics Lab	-	-	3	1.5
6	18CS0503	Programming for Problem Solving Lab	-	-	3	1.5
7	18ME0301	Workshop Practice Lab	-	-	4	2
Induction Program (3weeks)			-	-	-	-
<b>Contact periods / week</b>			11	2	10	<b>18</b>
			Total/Week			

**I YEAR – II SEMESTER**

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	18HS0801	Chemistry	3	1	-	4
2	18HS0831	Mathematics – II	3	1	-	4
3	18EE0240	Basic Electrical and Electronics Engineering	3	-	-	3
4	18HS0810	English	3	-	-	3
5	18ME0302	Engineering Graphics & Design	1	-	4	3
6	18HS0802	Chemistry Lab	-	-	3	1.5
7	18HS0811	English Lab	-	-	3	1.5
<b>Non – Credit Course</b>						
8	18HS0816	Indian Constitution	3	-	-	-
<b>Contact periods / week</b>			16	2	10	<b>20</b>
			Total/Week			

**II YEAR – I SEMESTER**

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	18HS0803	Biology for Engineers	3	-	-	3
2	18HS0832	Transform & Discrete Mathematics	3	1	-	4
3	18CE0102	Introduction to Civil Engineering	3	-	-	3
4	18CE0103	Introduction to Solid Mechanics	3	-	-	3
5	18CE0104	Introduction to Fluid Mechanics	3	-	-	3
6	18CE0105	Solid Mechanics Lab	-	-	3	1.5
7	18CE0106	Fluid Mechanics Lab	-	-	3	1.5
8	18CE0107	Computer Aided Building Drawing	-	-	2	1
<b>Non – Credit Course</b>						
9	18HS0804	Environmental Sciences	3	-	-	-
<b>Contact Periods / Week</b>			18	1	8	<b>20</b>
			Total/Week		<b>27</b>	

**II YEAR – II SEMESTER**

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	18ME0346	Mechanical Engineering	3	-	-	3
2	18CE0108	Engineering Geology	3	-	-	3
3	18CE0109	Surveying & Geomatics	3	-	-	3
4	18CE0110	Materials, Testing & Evaluation	3	1	-	4
5	18CE0111	Mechanics of Solids	3	-	-	3
6	18CE0112	Engineering Geology Lab	-	-	3	1.5
7	18CE0113	Surveying Lab – I	-	-	3	1.5
<b>Credit Course</b>						
8	COE – I	Comprehensive Online Exam – 1	-	-	-	1
<b>Non – Credit Course</b>						
9	18HS0817	Essence of Indian Traditional Knowledge	3	-	-	-
<b>Contact Periods / Week</b>			18	1	6	<b>20</b>
			Total/Week		<b>25</b>	

**III YEAR – I SEMESTER**

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	18CE0114	Hydraulic Engineering	3	-	-	3
2	18CE0115	Structural Engineering	3	1	-	4
3	18CE0116	Geotechnical Engineering	3	-	-	3
4	18CE0117	Hydrology & Water Resources Engineering	3	-	-	3
5	18CE0118	Engineering Economics, Estimation & Costing	3	-	-	3
6	18CE0119	Geotechnical Engineering Lab	-	-	3	1.5
7	18CE0120	Materials Testing Lab	-	-	3	1.5
8	18CE0121	Surveying Lab – II	-	-	2	1
<b>Non – Credit Course</b>						
9	18HS0820	Comprehensive Soft Skills	3	-	-	-
<b>Contact Periods / Week</b>			18	1	8	<b>20</b>
			Total/Week		<b>27</b>	

**III YEAR – II SEMESTER**

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	18CE0122	Construction Engineering & Management	3	-	-	3
2	18CE0123	Environmental Engineering	3	-	-	3
3	18CE0124	Transportation Engineering	3	-	-	3
4	<b>Professional Elective Course (PEC) – I</b>		3	-	-	3
	18CE0130	Advanced Structural Analysis				
	18CE0131	Open Channel flow				
	18CE0132	Railway Engineering				
5	<b>MOOCS – I</b>		-	-	-	3
	18CE011A	MOOCS – I				
	18CE011B	MOOCS – I				
	18CE011C	MOOCS – I				
6	18CE0125	Transportation Engineering Lab	-	-	2	1
7	18CE0126	Environmental Engineering Lab	-	-	2	1
8	18CE0148	Internship (60 Hours)	-	-	-	2
<b>Credit Course</b>						
9	COE – II	Comprehensive Online Exam – 2	-	-	-	1
<b>Non – Credit Course</b>						
10	18HS0842	Aptitude Practices	3	-	-	-
<b>Contact Periods / Week</b>			15	-	4	<b>20</b>
			<b>Total/Week 19</b>			

**IV YEAR – I SEMESTER**

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	18CE0127	Professional Practice, Law & Ethics	3	-	-	3
2	<b>Professional Elective Course (PEC) – II</b>		3	-	-	3
	18CE0133	Foundation Engineering				
	18CE0134	Repairs & Rehabilitation of Structures				
	18CE0135	Surface Hydrology				
3	<b>Professional Elective Course (PEC) – III</b>		3	-	-	3
	18CE0136	Concrete Technology				
	18CE0137	Traffic Engineering and Management				
	18CE0138	Design of Hydraulic Structures / Irrigation Engineering				
4	<b>Professional Elective Course (PEC) – IV</b>		3	-	-	3
	18CE0139	Design of Concrete Structures				
	18CE0140	Port and Harbour Engineering				
	18CE0141	Environmental Impact Assessment and Life Cycle Analyses				
5	<b>MOOCS – II</b>		-	-	-	3
	18CE012A	MOOCS – II				
	18CE012B	MOOCS – II				
	18CE012C	MOOCS – II				
6	18CE0128	Computer Aided Design Lab	-	-	3	1.5
7	18CE0129	Virtual Lab in Civil Engineering	-	-	3	1.5
8	18CE0149	Project Phase – I			4	2
<b>Contact Periods / Week</b>			12	-	10	<b>20</b>
			Total/Week		<b>22</b>	

**IV YEAR – II SEMESTER**

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	<b>Professional Elective Course (PEC) – V</b>		3	-	-	3
	18CE0142	Solid and Hazardous Waste Management				
	18CE0143	Airport Planning and Design				
	18CE0144	Prestressed Concrete				
2	<b>Professional Elective Course (PEC) – VI</b>		3	-	-	3
	18CE0145	Geographic Information Systems and Science				
	18CE0146	Bridge Engineering				
	18CE0147	Design of Steel Structures				
3	<b>Open Elective Course – I</b>		3	-	-	3
	18EE0238	Neural Networks & Fuzzy Logic				
	18ME0313	Non - Conventional Energy Sources				
	18EC0448	Elements of Embedded Systems				
	18CS0553	Web Designing and Internet Applications				
	18HS0814	Intellectual Property Rights				
4	<b>Open Elective Course – II</b>		3	-	-	3
	18EE0229	Electrical Energy Conservation & Auditing				
	18ME0329	Automobile Engineering				
	18EC0449	Mobile Cellular Communication				
	18CS0554	Cyber Laws & Ethics				
	18HS0815	Entrepreneurships Development				
5	18CE0150	Project Phase – II	-	-	16	8
<b>Contact Periods / Week</b>			12	-	16	<b>20</b>
			Total/Week		<b>28</b>	

**Note:**

- L – Lecture hour; T – Tutorial; Drg – Drawing; P Practical; C – Credits.
- **Total credits: 18+20+20+20+20+20+20+20=158**

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<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**(18HS0848) PHYSICS**

**Course objectives:**

- *Basic concepts of related to vectors & Scalars and Newton's laws of motion.*
- *Key points related to forces.*
- *Basic concepts related to Mechanical Vibrations.*
- *Key points related to Mechanics of Solids.*
- *To understand the fundamentals of Nano materials.*

**Course outcomes:**

*Studies will be familiar with*

- *Various basic terms related to Vectors & Scalars and Newton's laws of motion.*
- *Some of the basic concepts related to forces.*
- *Simple terms related to Mechanical Vibrations.*
- *Recognize importance of various mechanical properties of materials.*
- *Understand the importance of Nanotechnology.*

**UNIT – I:**

**MOTION OF PARTICLES:** Scalars and Vectors – Types of Forces in Nature-Newton's laws and its completeness in describing particle motion – Motion of a variable mass system, motion of a rocket.

**UNIT – II:**

**FRAMES OF REFERENCES:** Inertial & Non inertial frames of reference; Rotating coordinate system – Inertial forces and Properties - Centripetal and Coriolis forces– Effect of Coriolis force due to the rotation of the Earth - Applications of Centrifugal and Coriolis forces - Weather systems.

**UNIT – III:**

**HARMONIC OSCILLATORS:** Simple Harmonic oscillator and solution of differential equation, Damped harmonic motion and solution of differential equation – over damped, critically damped and lightly damped oscillators- Forced oscillations and resonance (qualitative treatment).

**UNIT – IV:**

**MECHANICS OF SOLIDS:** Elasticity and isotropic materials, stress, strain and Hooke's Law- Elastic constants of Isotropic solids. Internal energy due to strain – longitudinal strain, volume strain and shearing strain - Beams- classification-types of support.

**UNIT-V:**

**PHYSICS OF NANOMATERIALS:** Introduction, significance of nano scale – Surface area and Quantum confinement- Quantum dot, Quantum well ,Quantum wire -Synthesis of

nanomaterials- Top Down Process- Ball Milling ; Bottom Up Process: Sol-Gel method– CNT- Properties of Graphene- Applications.

**Text / Reference books:**

1. Engineering Mechanics, 2nd ed. — MK Harbola.
2. Introduction to Mechanics — MK Verma.
3. Engineering Mechanics - Dynamics, 7th ed. - JL Meriam.
4. An Introduction to the Mechanics of Solids, 2nd ed. with SI Units — SH Crandall, NC Dahl & TJ Lardner.
5. Engineering Mechanics of Solids — EP Popov.
6. B.E.A. Saleh and M.C, Tech, Fundamentals of photonics, John Wiley & Sons.
7. Mechanics and Properties of Matter – J.C.Upadhyaya, Himalaya Publishing House.
8. Waves & Oscillations – D.V.Bhrahmaji and A.Srinivasa Rao, Vivek Publications
9. Engineering Physics – K.Thyagarajan, MCGrawHill Education Private Ltd, New Delhi.



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	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>

**(18HS0830) MATHEMATICS – I**

**Course Objectives:**

*The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:*

- *To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.*
- *To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.*
- *To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.*
- *To familiarize the student with functions of several variables that is essential in most branches of engineering.*
- *To develop the essential tool of matrices and linear algebra in a comprehensive manner.*

**Course Outcomes:**

*The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.*

**UNIT – I**

**Matrices:** Inverse and rank of a matrix; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigen vectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

**UNIT – II**

**Calculus:** Evaluation of definite and improper integrals; Applications of definite integrals to evaluate surface areas and volumes of revolutions; Beta and Gamma functions and their properties. Rolle's Theorem, Mean value theorems (without proof) Taylor's and Maclaurin's theorems.

**UNIT – III**

**Multivariable Calculus:** Limit, continuity and partial derivatives, total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, directional derivatives, curl and divergence.

**UNIT – IV**

**Sequences and Series:** Convergence of sequence and series, tests for convergence (Geometric test, P- test, limit comparison test, D' Alembert ratio test, Cauchy' s nth root test); Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

**UNIT-V**

**Fourier Series:** Determination of Fourier coefficients- Fourier series- Even and odd functions, Fourier Series in an arbitrary interval, Periodic function, Half range sine and cosine series,

**Text Books:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-42<sup>nd</sup> Edition(2012)
2. Engineering Mathematics Volume-I, by T.K.V. Iyengar, S.Chand publication-12<sup>th</sup>Edition
3. A Text book of B.Sc. mathematics volume-II, V.Venkateswara Rao S.Chand Publications

**References:**

1. Ramana B.V. Higher Engineering Mathematics,Tata McGraw Hill New Delhi,11thReprint, 2010.
2. Engineering mathematics, volume-I&II, E.Rukmangadachari & E.Keshava Reddy Pearson Publishers.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
5. Bhavanari Satyanarayana, T.V.Pradeepkumar&D.Srinivasulu “Linear Algebra & Vector Calculus”, Studera Press, New Delhi.

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<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>

**(18CS0501) PROGRAMMING FOR PROBLEM SOLVING**

**Course Objectives:**

- To understand the core aspects of computer problem solving techniques
- To understand the programming language constructs
- To understand the programming paradigms

**Course Outcomes:**

- Able to design the flowchart and algorithm for real world problems
- Able to learn and understand new programming languages
- Able to construct modular and readable programs
- Able to write C programs for real world problems using simple and compound data types

**UNIT I**

**OVERVIEW OF COMPUTERS AND C-PROGRAMMING:** Description of Computer Hardware & Software.

**INTRODUCTION TO C:** overview of C, executing a 'c' program, c-character set, constants, variables, data types, declaration of variables, assigning values to variables, managing input & output operations, operators and expressions, basics of algorithm and flow chart

**UNIT II**

**DECISION&LOOPCONTROL STATEMENTS:** Introduction, If Statement, If-else Statement, Nested- If-else Statement, Else if Ladder, Switch case – break – continue – go to Statement ,for loop, nested for loop, while loop, do-while, do-while statement with while loop

**UNIT III**

**ARRAYS:** Introduction, one-dimensional (1D)-Arrays, declaration and initialization of one-dimensional (1D)-Arrays, Two- dimensional (2D)-Arrays, initialization of Two-dimensional (2D)-Arrays, Multi-dimensional Arrays

**FUNCTIONS:** Introduction, need for user-defined functions, a multi-function program, elements of user-defined functions, definition of functions, return values and types, category of functions, recursion, scope and life time of variables, preprocessor commands:#define, #include, multi file programs

**UNIT IV**

**POINTERS:** Introduction, understanding pointers, accessing address of a variable, declaring and initialization of pointer variables, accessing variable through pointers, chain of pointers, pointer expressions, pointer increment and scale factor, pointers and arrays, passing arrays to functions, array of pointers, pointers as function arguments, functions returning pointers.

**STRINGS:** Introduction, declaring and initializing string variables, reading and writing strings, arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions, table of strings (array of strings)

#### **UNIT V**

**STRUCTURES:** Introduction , defining a structure , declaring structure variables ,accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members , arrays of structures ,arrays within structures, structures within structures, structures and functions, unions, typedef, enum

**File Management in C:** Introduction, Types of Files, Defining and Opening a File, Closing a File, Input / Output Operations on Files, Error handling during IO Operations, Random access to files, Command line arguments.

#### **Text Books:**

1. C and Data Structures – Ashok Kamthane Pearson education
2. Programming in C and Data Structures – E Balagurusamy – Mc GrawHill.

#### **References:**

1. Computer Fundamentals and C Programming - Dr. P. Chenna Reddy, ISBN: 9789351045885, Publisher: Pothi.com
2. Programming in C, Second Edition – Pradip Dey, Manas Ghosh, and Oxford University Press.
3. “C from Theory to Practice”- George S. Tselikis- Nikolaos D. Tselikas- CRC Press.
4. “Programming with C”- R S Bichkar- University Press.
5. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education. (UNIT-I)

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<b>2</b>	<b>1</b>	<b>-</b>	<b>3</b>

**(18CE0101) ENGINEERING MECHANICS**

**Course Objectives:**

- *To learn about forces and force systems and their applications.*
- *To learn about friction and to use the concept of Friction.*
- *To learn how to find centroid of different objects using Mathematical formula.*
- *To learn how to find Moments of Inertia of different objects using Mathematical formula.*

**Course Outcomes:**

*On completion of this course, the student will be able to*

- *Construct free body diagrams and develop appropriate equilibrium equations.*
- *Understand the concepts of friction and to apply in real life problems.*
- *Determine the centroid for composite sections.*
- *Determine the Moment of Inertia for composite sections.*

**UNIT-I**

**FORCES & FORCE SYSTEMS:** Fundamental Principles – Resolution and Composition of Forces and Equilibrium of Particles – Lami’s Theorem - Principle of Transmissibility – Principles of Continuum - Types of Force Systems – Resultant of Coplanar, Concurrent and Non-Concurrent Force Systems -Varignon’s Theorem - Equilibrium of Coplanar Force Systems – Types of Beams and Supports – Support Reactions.

**UNIT-II**

**FRICITION:** Types of Friction– Laws of Friction–Limiting Friction–Cone of Limiting Friction - Ladder Friction - Wedge, Screw jack and differential Screw Jack

**UNIT-III**

**CENTROID:** Centroids of Simple Figures (From Basic Principles) – Centroids of Composite Figures

**CENTRE OF GRAVITY:** Centre of Gravity of Simple Body -Centre of Gravity of Composite Bodies- Pappus Theorem

**UNIT-IV**

**MOMENT OF INERTIA:** Definition – Parallel Axis Theorem and Perpendicular Axis Theorem – Polar Moment of Inertia – Radius of Gyration – Moment of Inertia of Basic Shapes - Composite Sections - Simple Solids.

**UNIT-V**

**ANALYSIS OF PERFECT TRUSSES:** Types of Trusses – Perfect, Deficient and Redundant Trusses - Cantilever Trusses and Simply Supported Trusses – Analysis of Trusses using Method of Joints and Methods of Sections.

**Text Books:**

1. A Textbook of Engineering Mechanics, 3rd Edition, Bhavikatti S S , New Age International, 2016.
2. Engineering Mechanics, Dr. R. K. Bansal, 4th Edition, Laxmi Publications, 2011.

**References:**

1. Engineering Mechanics, D.S. Kumar, 3rd Edition, S.K. KATARIA & SONS
2. Singer's Engineering Mechanics: Statics and Dynamics, 3rd Edition, K. Vijaya Kumar Reddy, J. Suresh Kumar, B.S. Publications, 2011.
3. Engineering Mechanics: Statics, 6th Edition, J L Meriam, L G Kraige, Wiley India Pvt. Ltd, 2001.
4. Engineering Mechanics: Dynamics, 6th Edition, J L Meriam, L G Kraige, Wiley India Pvt. Ltd, 2010.

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-	-	3	1.5

**(18HS0852) PHYSICS LAB**

**Course Description:**

*Physics practical course is meant for making the students to gain practical knowledge to correlate with the theoretical studies. It covers experiments on principle of Mechanics and Optics, measurement of magnetic field and studying resonance using LCR circuit.*

**Course Objectives:**

- *To explore the application of Interference and Diffraction by doing concerned experiments.*
- *Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.*
- *To understand the concept of energy gap, B-H curve and resonance phenomena in LCR circuits.*
- *Develop an ability to apply the knowledge of physics experiments in the later studies.*

**Suggested list of experiments from the following: (Perform any EIGHT experiments from the following)**

1. Determination of wavelengths of various colors of Mercury spectrum using Diffraction Grating – Normal Incidence method.
2. Determination of Dispersive power of prism.
3. Rigidity Modulus – Torsional Pendulum
4. Study of Resonance effect in Series and Parallel LCR circuit.
5. Determination of thickness of thin object by wedge method.
6. Determination of radius of curvature of Plano convex lens – Newton's Rings.
7. Determination of wavelength of a given laser source by using diffraction grating.
8. Determination of particle size using laser source.
9. Determination of energy gap of a semi conductor using p – n junction diode.
10. B- H curve.
11. Magnetic field along the axis of current carrying coil – Stewart & Gee's Method.
12. Determination of frequency of tuning fork - Melde's Apparatus.
13. Determination of spring constant – Coupled Oscillator.
14. Study of Characteristics of Solar Cell.
15. Determination of Numerical Aperture of an Optical fiber.

**Reference books:**

1. Engineering Physics practical – NU Age Publishing House, Hyderabad.
2. Engineering Practical Physics – Cengage Learning, Delhi.

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-	-	3	1.5

**(18CS0503) PROGRAMMING FOR PROBLEM SOLVING LAB**

**Course Objectives:**

- To make the student learn C Programming language.
- To make the student solve problems, implement those using C & C++ programming languages.
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem.

**Course Outcomes:**

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

- Apply problem solving techniques of C to find solution.
- Use C language features effectively to implement solutions.
- Use C++ language features effectively to solve problems.
- Identify and develop apt searching and sorting technique for a given problem.
- Identify, design and develop the appropriate data structure for a given problem or application.

**Experiments List:**

1. a) Acquainting students to “c” programming environment and DOS commands  
b) Calculate sum of three numbers using c-program
2. a) swap(exchange) values of two integer variables using c-program  
b) Read an integer, a character and a float values through keyboard and display  
c) Check operators precedence and associativity using c-program  
d) Write a c-program using all basic data types of c language
3. a) Read 3 integer values through keyboard and display largest among them  
b) Read marks of 5 subjects obtained by a student through keyboard and display “fail” or “pass” message on console  
c) Using switch () statement implement arithmetic operations
4. a) Check whether entered number is prime number  
b) Display factorial of entered number  
c) Display all multiples of an entered number upto given value (n)
5. a) Generate fibonacci series upto entered number(n)  
b) Find out sum of the digits of a number
6. a) Find the binary equivalent of entered decimal number  
b) Generation multiplication table of entered number (n)
7. a) Calculate sum of two integer matrices  
b) Calculate product of two integer matrices



8. a) Create your header file by including 2 user(your) defined functions and include them in a c-program student  
b) Find out factorial of a number using recursive function  
c) Find square of an entered number using “call by address (reference)” technique  
d) A program that tells us purpose of few predefined functions in “math.h” header file
9. a) check whether entered string is palindrome  
b) Write a program to sort the entered set of strings using structure concept
10. a) Count number of vowels, consonants, digits, white spaces and special characters in entered string(a line of text)  
b) Swap (exchange) values of two integer variables using pointers
11. a) For 3 students with 3 subjects, calculate total marks and grade obtained by each  
b) Read data from a file (text) and display it on the monitor
12. a) Copy contents of one file(text) to other created file  
b) Merge contents of two files (text) and store it in another created file

**References:**

1. How to Solve it by Computer, R.G. Dromey, Pearson.
2. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Pearson.
3. Let us C Yeswant Kanetkar, BPB publications
4. Pointers in C, Yeswant Kanetkar, BPB publications.
5. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education

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	-	-	4	2

**(18ME0301) WORKSHOP PRACTICE LAB**

**Course Objectives:**

- *The course provides hands-on training in the trades of Carpentry, Fitting, House-wiring, Tin Smithy, and Foundry. Overview of metal cutting processes, plumbing and welding is provided through live demonstrations.*

**Course Outcomes:**

*After completion of this course, a successful student will be able to:*

- *Utilize workshop tools for engineering practice.*
- *Employ skills for the production a component for real time applications.*
- *Appreciate the hard work and intuitive knowledge of the manual workers.*

**LIST OF EXPERIMENTS:**

**1. TRADES FOR EXERCISES**

- a. Carpentry shop:** Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, Cross lap joint, Mortise and tenon T joint, Bridle T joint from soft wood stock.
- b. Fitting shop:** Two joints (exercises) from: Square joint, V joint, half round joint or Dovetail joint out of 100 x 50 x 5 mm M.S. stock.
- c. Sheet metal shop:** Two jobs (exercises) from: Tray, Cylinder, Hopper or Funnel from out of 22 or 20 gauge G.I. sheet.
- d. House-wiring:** Two jobs (exercises) from: Wiring for ceiling rose and two lamps (bulbs)with independent switch, two way switch, controls with or without looping, wiring for stair case lamp, wiring for water pump with single phase starter.
- e. Foundry:** Preparation of two moulds (exercises): for a single pattern and a double pattern.
- f. Welding:** Preparation of two welds (exercises): Single V butt joint, Lap joint, Double V butt joint or T fillet joint.

**2. TRADES FOR DEMONSTRATION:**

- a. Plumbing**
- b. Machine Shop**
- c. Metal Cutting**

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

**References:**

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009
2. Work shop Manual, P.Kannaiah & K.L.Narayana, SciTech Publishers.
3. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

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**(18HS0801) CHEMISTRY**

**Course Objectives:**

- Developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools
- Technology is being increasingly based on the electronic, atomic and molecular level modifications.
- Quantum theory is more than 100 years old and to understand phenomena at Nanometer levels, one has to base the description of all chemical processes at molecular levels.

**Course Outcomes:**

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Able to design the flowchart and algorithm for real world problems
- Able to learn and understand new programming languages
- Able to construct modular and readable programs Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.

**UNIT-I**

**ATOMIC, MOLECULAR STRUCTURE AND PERIODIC PROPERTIES:** Schrodinger wave equation, Molecular orbital's of diatomic molecules. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties.

Effective Nuclear charge, variations of s, p, d and f orbital energies of atoms in the periodic table, atomic and ionic sizes, oxidation states, hard soft acids and bases, molecular geometries.

**UNIT-II**

**USES OF FREE ENERGY AND CHEMICAL EQUILIBRIA:** Thermodynamic functions: Energy Entropy and free energy, Cell potentials, Nernst equations and Its Applications. Acid base Oxidation, reduction and Solubility Equilibria.

Corrosion: Types of Corrosion, Factors Influencing the rate of Corrosion, Prevention of Corrosion (Sacrificial anodic protection, Impressed Cathodic Protection), Anodic and Cathodic Inhibitors, Electro plating (Copper, Nickel, Chromium) and Electroless Plating.

**UNIT-III**

**WATER TECHNOLOGY:** Hardness of water and its units, Estimation of Hardness by EDTA method. Boiler Troubles: Scale & Sludge, Priming and Foaming and Boiler corrosion. Municipal Solid waste water Treatment. Break point chlorination, Water softening methods (Lime-Soda, Zeolite, Ion- Exchange resins). Demineralization of Brackish Water: Reverse Osmosis and Electro Dialysis.

#### UNIT-IV

**ORGANIC REACTIONS AND ORGANIC POLYMERS:** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, Synthesis of a commonly used drug molecules (Paracetamol, Penicillin, Prodrugs - Aspirin, Sulfa drugs)

Organic polymers types (Thermosetting and Thermoplastics), Preparation, Properties and Engineering Applications of PVC, Teflon, Nylon6,6, Bakelite), Moulding Process and its uses, Conducting polymers (polyacetylene, Polyaniline).

#### UNIT-V

**SPECTROSCOPIC TECHNIQUES AND APPLICATIONS:** Principles, selection rules and applications of absorption (UV/Visible, Atomic Absorption, Infrared) and Emission spectroscopy (Flame photometry and Fluorescence and its applications in medicine. Advanced Instrumental Techniques and their Significance: XRD, Scanning Electron microscope (SEM) and Transmission electron microscopy (TEM).

#### Text Books:

- (i) University chemistry, by B. H. Mahan
- (ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- (iii) Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- (iv) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
- (v) Physical Chemistry, by P. W. Atkins
- (vi) Organic Chemistry: Structure and Function by K. P. C. Vollhardt and N. E. Schore, 5th Edition <http://bcs.whfreeman.com/vollhardtschore5e/default.asp>

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**(18HS0831) MATHEMATICS – II**

**Course Objectives:**

*The objective of this course is to familiarize the prospective engineers with techniques in Multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:*

- *To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.*
- *To introduce effective mathematical tools for the solutions of differential equations that model physical processes.*
- *To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.*

**Course Outcomes:**

*The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariable calculus and complex analysis. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of Mathematics and applications that they would find useful in their disciplines.*

**UNIT-I**

**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.

**UNIT-II**

**Ordinary differential equations of higher orders:** Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

**UNIT-III**

**Multivariable Calculus (Integration):** Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Triple integrals (Cartesian), orthogonal curvilinear coordinates.

**UNIT-IV**

**Complex Variable – Differentiation:** Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

**UNIT-V: Complex Variable – Integration:** Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (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.

**Text Books:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers
2. Engineering Mathematics Volume-I &III by T.K.V. Iyengar, S.Chand publication

**Reference Books:**

1. Engineering Mathematics, volume-I&III, E. Rukmangadachari& E.Keshava Reddy Pearson Publishers
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
3. Engineering Mathematics-I & III, T.K.V.Iyengar S.Chand Publications.
4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

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**(18EE0240) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

**Course Objectives:**

- *To understand the nature of different circuit elements, fundamental laws and network Theorems.*
- *Understand the operation of dc machines and single phase transformers.*
- *Understand the characteristics of the p-n junction diode.*
- *Understand the characteristics of BJT, FET, MOSFET and characteristics of special purpose electronic devices.*

**Course Outcomes:**

*Upon completion of the course, students will:*

- *Determine the equivalent impedance of given network by using network reduction techniques.*
- *Determine the current through any element and voltage across any element*
- *Apply the network theorems suitably.*
- *Analyze the operating principles of motor and transformer.*
- *Analyze the operating principles of major electronic devices, its characteristics and applications.*
- *Design and analyze the DC bias circuitry of BJT and FET.*

**PART-A**

**UNIT – I**

**INTRODUCTION TO ELECTRICAL ENGINEERING**

Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Types of Sources, Resistive Networks, Inductive Networks, Capacitive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities.

**UNIT- II**

**NETWORK THEOREMS & TWO PORT NETWORKS**

**Network Theorems:** Thevenin's, Norton's, Maximum Power Transfer, Reciprocity and Superposition Theorems for DC Excitations.

**Two Port Networks:** Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations.



**UNIT-III****DC MOTORS and TRANSFORMERS**

**DC Motors:** Principle of Operation of DC Motors, Types of DC Motors, Torque Equation, Losses and Efficiency Calculation in DC Motor - Swinburne's Test and Applications.

**Transformers:** Principles of Operation, EMF equation, Losses and Efficiency, Regulation of Transformer, Testing: OC & SC Tests.

**PART-B****UNIT I**

**Semiconductor Devices:** Intrinsic semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction –Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics-Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters, Zener Diode-Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.

**UNIT II**

**BJT:** Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT-CB, CE and CC Configurations, Relation between  $I_C$ ,  $I_B$  and  $I_E$ . Transistor Biasing- Fixed Bias, Voltage Divider Bias, Transistor Applications- Transistor as an Amplifier, Transistor as a Switch.

**UNIT III**

**JFET & MOSFET:** Junction Field Effect Transistor (JFET)- Theory and Operation of JFET, Output Characteristics, Transfer Characteristics, Configurations of JFET-CD, CS and CG Configurations, JFET Applications- JFET as an Amplifier, JFET as a Switch, Comparison of BJT and JFET, MOSFET-The Enhancement and Depletion MOSFET, Static Characteristics of MOSFET, Applications of MOSFET.

**Text Books:**

1. "Basic Electrical Engineering", M.S.Naidu and S. Kamakshiah – TMH.
2. "Basic Electrical Engineering", T.K.Nagasarkar and M.S. Sukhija Oxford University Press.

**References:**

1. "Theory and Problems of Basic Electrical Engineering", D.P.Kothari & I.J. Nagrath PHI.
2. "Principles of Electrical Engineering", V.K Mehta, S.Chand Publications.
3. "Fundamentals of Electrical Electronics Engineering", T.Thyagarajan, SCITECH Publications 5th Edition-2007.
4. "Electrical and Electronic Technology", Hughes – Pearson Education, 2012.

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**(18HS0810) ENGLISH**

**Course Objectives:**

- To develop interest in reading English Literature for language learning.
- To improve knowledge and understanding of Grammar.
- To enhance the ability for making use of grammar in writing English.
- To enrich communication skills among the students.
- To develop their insight and positive attitude towards English language.
- To impart LSRW skills and inculcate the habit of learning.
- To build vocabulary.

**Course Outcomes:** Students will be able:

- To understand the rules of English grammar and their usage in writing English.
- To use LSRW skills through the prescribed text and develop their ability to communicate effectively.
- To get the mastery of language to express ideas, views, feelings and experience.
- To communicate well among themselves.
- To inculcate values and ideal characteristic qualities in themselves.

**UNIT - I**

**Reading:**

1. *All the World's a Stage* by William Shakespeare. (Act-II, Scene-VII).
2. *After Twenty Years* by O. Henry.

**Writing:** Nature and Style of Sensible Writing: Describing & Defining.

**Speaking:** Oral Communication (involves interactive practice sessions) Self -introduction and introducing a friend.

**Listening:** Listening activity (Present tense).

**Vocabulary:** The concept of word formation & root words from foreign languages.

**Grammar:** Subject – Verb Agreement. Sentence Structures & use of phrases and clauses in sentences. Identify common errors in noun, pronoun and adjectives.

**UNIT - II**

**Reading:**

1. *I Have a Dream* Martin Luther King jr.
2. *Knowledge and Wisdom* by Bertrand Russell.

**Writing:** Importance of proper punctuation and creating coherence- Simple sentences.

**Speaking:** Expressing apology.

**Listening:** Listening activity. (Past tense)

**Vocabulary:** Prefixes and Suffixes.

**Grammar:** Identifying common errors in Articles, Modifiers and degrees of comparison.

### UNIT - III

**Reading:**

- 1) Nelson Mandela (Biography)
- 2) “The Happy Prince” by Oscar Wilde.

**Writing:** Paragraph writing – letter writing.

**Speaking:** Situational dialogues.

**Listening:** Listening activity. (Future tense)

**Vocabulary:** Synonyms and Antonyms.

**Grammar:** Identifying common errors in Prepositions and Link words and complex sentences.

### UNIT - IV

**Reading:**

1. *Where the Mind is without Fear* by Rabindra Nath Tagore.
2. Cause - Effect and Control Measures of Pollution (Air, Water, Noise) and Nuclear Hazards.

**Writing:** Essay writing - Organizing principles of essay writing - Introduction and Conclusion.

**Speaking:** Public speaking dynamics.

**Listening:** Listening activity. (Active voice and passive voice)

**Vocabulary:** Abbreviations and Acronyms.

**Grammar:** Identifying common errors in redundancies and compound sentences.

### UNIT - V

**Reading:**

1. *The Road not Taken* by Robert Frost.
2. *An Astrologer's Day* by R K Narayan.

**Writing:** Techniques for writing precisely.

**Speaking:** Interviews and formal presentations.

**Listening:** speeches of A P J Abdul Kalam, Steve Jobs and so on.

**Vocabulary:** One word substitutes.

**Grammar:** Identifying common errors in clichés.

**Reference Books:**

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007.
3. On Writing Well. William Zinsser. Harper Resource Book, 200.
4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press, 2006.
5. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press, 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyd. Oxford University Press, 2005.
7. Oscar Wilde, Create Independence Publisher, Kindle Edition, 2017.
8. The Complete Works of William Shakespeare, Kindle Edition, 2017.
9. G. P. Editors, the Complete Works of William Shakespeare, Global Classic, 2018.
10. Robert Frost, Robert Frost Collection, Wider Publication, 2011.

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**(18ME0302) ENGINEERING GRAPHICS & DESIGN**

**Course Objectives:**

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

**Course Outcomes:**

*Students undergoing this course are able to*

- *Frame ideas based on the conceptual modeling and design*
- *Provide good understanding of the methods involved in preparing various views in Engineering drawings*
- *Can prepare 2D and 3D diagrams of various objects*

**UNIT-I**

**Introduction to Engineering Drawing** - Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections, Cycloids and Involutives.

**UNIT-II**

**Projections of Points** - Principles of Orthographic Projections-Conventions - Projections of Points, Traces

**Projections of straight lines** Inclined to both the planes - simple problems only, Traces

**UNIT-III**

**Projections of Planes** – Planes (Inclined to single plane only)

**Projections of Solids-** Introduction– Projections of right regular solids-Prisms, Pyramids in different positions. (Single plane only)

**UNIT-IV**

**Sections of solids** - Sectional Views of Right regular Solids - Prisms, Pyramids.

**Development of surfaces** - Development of surfaces of Right Regular Solids - Prisms, Pyramids.

**UNIT-V**

**Orthographic Projections** - Principles of Orthographic projection, Conversion of objects from 3D to 2D

**Isometric Projections** - Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids, Conversion of 2D to 3D.

**Auto CAD (for Practice only not for External Exam)**

**Introduction to CAD**, Applications, commands, Tool bar, modeling of Simple parts, isometric problems.

**Text Books:**

1. Engineering Drawing, N.D.Bhatt, Charotar Publishers
2. A text Book of Engineering Drawing, K.L.Narayana, Kannaiah, Scitech Publishers, 2010
3. Engineering Graphics with using AutoCAD,2007. Jeyapoovan.T, Vikas Publishing House

**References:**

1. Fundamentals of Engineering Drawing, Warren J.Luzadder and Jon. M.Duff Prentice Hall of India Pvt., Ltd., Eleventh Edition, 2001.
2. Engineering Graphics, Bhattacharyya, S.C.Bera, I.K .International Pvt Ltd. 2009.
3. A text Book of Engineering Drawing and Graphic, K.Venugopal New Age Publishin New Delhi, 2008.

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**(18HS0802) CHEMISTRY LAB**

**Laboratory Outcomes**

*The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:*

- *Estimate rate constants of reactions from concentration of reactants/products as a function of time.*
- *Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.*

*Synthesize a small drug molecule and analyse a salt sample.*

**List of Experiments:**

1. Estimation of copper by EDTA method
2. Determination of chloride content of water
3. Determination of acidity of water sample.
4. Determination of alkalinity of water sample
5. Potentiometric determination of Fe<sup>2+</sup> by potassium permanganate.
6. Determination of Viscosity of an oil by Redwood Viscometer
7. Determination of dissolved oxygen in a water sample by Winkler's method
8. Conductometric titrations of strong acid against strong base.
9. Chemical analysis of a salt
10. Synthesis of a polymer/drug

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**(18HS0811) ENGLISH LAB**

**Course Objectives:**

*To get the job students dream of today largely depends on the way they communicate. Due to globalization, civilization and fast growing technologies, communication has become a very important factor. Good communication skills increase the possibilities of getting good jobs. To meet the requirement of corporate world one has to be capable of expressing oneself.*

- *To provide Computer Assisted Language Learning facility for the students on self-instructional method for improving language.*
- *To improve the correct articulation as English is international language.*
- *To enhance the communication skills with a variety of activities and practice sessions.*

**Course Outcomes:**

*Students will be able:*

- *To recognize sounds of English language with different classifications.*
- *To know phonetic transcription and phonemic symbols of English language.*
- *To understand international accent and utilize the same in their daily conversation.*
- *To crease confidence for public speaking, for facing interviews, for making effective oral presentations, for having discussions, and for delivering impromptu speeches.*

**UNIT - I**

- a) Importance of Phonetics – Introduction, organs of speech, classification of sounds, and Phonetic transcriptions.

**UNIT - II**

- a) Syllable, Syllabification, Word stress, Stress Rules and Intonation.
- b) Intonation (Falling, Raising, and fall-raise) - Pitch and Rhythm.
- c) Influence of mother tongue (MTI) - Common Indian Variants in pronunciation.
- d) Difference between British and American Pronunciation

**UNIT - III**

- a) Vocabulary building.
- b) Functional English; Telephone skills; Giving Directions; Situational dialogues; Role play.
- c) JAM, Oral presentation-Prepared and extempore and PPT presentation.

**UNIT - IV**

- a) Describing people, places, things and situations- Body language— listening some

**UNIT - V**

- a) Preparation of resume (C.V) & Cover Letter.
- b) Interview Skills - mock interviews.
- c) Group Discussion, Debate and Dress code.

**Minimum requirement for ELCS LAB**

1. Computer Assisted Language Learning (CALL) Lab: The Computer Aided Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.
2. The Communication Skills Lab with movable chairs and audio visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.  
System Requirement (Hardware component):  
Computer network with: LAN with minimum 60 multimedia systems with the following Specifications:
  - i) P- IV Processor
    - a) Speed 2.8 GHZ
    - b) RAM – 512 MB Minimum
    - c) Hard Disk – 80 GB
  - ii) Headphones of High quality.

**Suggested Software:**

1. Clarity pronunciation power--- Part 1(sky pronunciation)
2. Clarity pronunciation power--- Part 2
3. K-Van Advanced Communication Skills.
4. Walden Info tech Software.

**References Books:**

1. A Textbook of English Phonetics for Indian Students, second edition T. Balasubramanian. (McMillan) 2012.
2. A Course in Phonetics and spoken English, DhamijaSethi, Prentice-hall of India Pvt. Ltd, 2000.
3. Speaking English Effectively, second Edition Krishna Mohan & NP Singh 2011 (McMillan).
4. A Hand Book of English Laboratories, E.Sureshkumar , P.Sreehari, Foundation books, 2011.
5. Spring Board Success, Sharada Koshik, Bindu Bajwa, Orient Black Swan, Hyderabad, 2010.



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**(18HS0816) INDIAN CONSTITUTION**

**Course Objectives:**

*Students will be able to:*

- *Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.*
- *To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*
- *To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.*

**Course Outcomes:**

*Students will be able to:*

- *Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.*
- *Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.*
- *Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.*
- *Discuss the passage of the Hindu Code Bill of 1956.*

*The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.*

*The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the*

*Constitution of India has also been amended more than one hundred times.*

*These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".*

**Course content**

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India.
9. Amendment of the Constitutional Powers and Procedure.
10. The historical perspectives of the constitutional amendments in India.
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India.
13. Scheme of the Fundamental Right to Equality.
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

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**(18HS0803) BIOLOGY FOR ENGINEERS**

**Course Objectives:**

- Describe how biological observations of 18th Century that lead to major discoveries.
- Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
- Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
- Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine

**Course Outcomes:**

- Classify enzymes and distinguish between different mechanisms of enzyme action.
- Identify DNA as a genetic material in the molecular basis of information transfer.
- Analyse biological processes at the reductionistic level
- Apply thermodynamic principles to biological systems.
- Identify and classify microorganisms.

**UNIT I**

**INTRODUCTION & CLASSIFICATIONS OF ORGANISMS**

Introduction - classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilisation -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricotelic, ureotelic (e) Habitata- aquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms - study of different groups - E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus.

**UNIT II**

**GENETICS PURPOSE**

Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis- Concepts of recessiveness and dominance - Concept of mapping of phenotype to genes - single gene disorders in humans - Complementation in human genetics.

**UNIT III****BIOMOLECULES PURPOSE & ENZYMES PURPOSE**

Building blocks of Molecules of life & it's types. Introduction & Concepts- Monomer units and polymeric structures, Sugars, starch, cellulose, Amino acids, proteins, Nucleotides, DNA/RNA, Two carbon units and lipids.

Role of catalysis life in existed on earth Enzymology: Enzyme classification. Mechanism of enzyme action. Enzyme kinetics and kinetic parameters related to Biology. RNA catalysis. Classifications and Procedure for Enzyme catalysed reactions with two examples.

**UNIT IV****INFORMATION TRANSFER PURPOSE & MACROMOLECULAR ANALYSIS PURPOSE**

Molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. Genetic material of DNA, Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Introduction and Explanation of genetic code and degeneracy of genetic code. Gene - complementation and recombination.

Biological processes at the reductionist level Proteins - structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

**UNIT V****METABOLISM PURPOSE**

The principles of energy transactions - in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergonic reactions. Concept of  $K_{eq}$  and its relation to standard free energy. Spontaneity. ATP as an energy currency- including breakdown of glucose to  $CO_2 + H_2O$  (Glycolysis and Krebs cycle) and synthesis of glucose from  $CO_2$  and  $H_2O$  (Photosynthesis). Energy yielding and energy consuming reactions.

Microbiology -single celled organisms -species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.

**References:**

- 1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- 2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons

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- 3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
  - 4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
  - 5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown

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**(18HS0832) TRANSFORM & DISCRETE MATHEMATICS**

**Course Objectives:**

*The objective of this course is to familiarize the prospective engineers with techniques in Transform Calculus and Discrete Mathematics. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:*

- *To acquaint the student with mathematical tools needed in evaluating Transform Calculus and their usage.*
- *To train the students thoroughly in Mathematical concepts of Algebraic structures, Recurrence Relation, Graph Theory.*
- *To develop the skill pertinent to the practice of the mathematical concepts including the student's abilities to formulate and modelling the problems, to think creatively and to synthesize information.*

**. Course Outcomes:**

*The objective of this course is to familiarize the prospective engineers with techniques in Transform Calculus and Discrete Mathematics. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.*

**UNIT- I**

**Transform calculus-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 transforms. Solving ODEs by Laplace Transform method.

**UNIT- II**

**Transform calculus-II:**

**Fourier transforms:**

Fourier sine and cosine transform, properties, inverse Fourier transforms, finite Fourier transforms.

**UNIT- III**

**Algebraic structures:**

Algebraic structures with one binary operation – semi group, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup.

**UNIT-IV****Introduction to counting:**

Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, Combination, summations. Introduction to recurrence relation and generating functions.

**UNIT-V****Introduction to graphs:**

Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.

**Text Books:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics II by T.K.V. Iyengar, S.Chand publications.
3. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.

**Reference Books:**

1. E.Rukmangadachari & E.Keshava Reddy Engineering mathematics, volume-II, Pearson Publishers
2. N. Deo, Graph Theory, Prentice Hall of India, 1974.
3. S. Lipschutz and M. L. Lipson, Schaum's Outline of Theory and Problems of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 1999.
4. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997.

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**(18CE0102) INTRODUCTION TO CIVIL ENGINEERING**

**Course Objectives:**

- *To give an understanding to the students of the vast breadth and numerous areas of engagement available in the overall field of Civil Engineering*
- *To motivate the student to pursue a career in one of the many areas of Civil Engineering with deep interest and keenness.*
- *To impart knowledge of construction practices*
- *This subject provides the knowledge of building bye laws, registration, planning of various types of buildings.*

**Course Outcomes:**

- *Introduction to what constitutes Civil Engineering*
- *Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering*
- *Highlighting the depth of engagement possible within each of these areas*
- *Supervise the construction activities*
- *Able to understand the Building Byelaws*
- *Able to plan a residential & public building*

**UNIT – I**

**INTRODUCTION TO CIVIL ENGINEERING:** Engineering and Civil Engineering - History of Civil Engineering - Early Constructions and Developments over Time

**BROAD DISCIPLINES OF CIVIL ENGINEERING:** Environmental Engineering & Sustainability - Geotechnical Engineering - Structural Engineering - Traffic & Transportation Engineering – Architecture – Photogrammetry, Remote Sensing and GIS, Hydraulics, Hydrology & Water Resources Engineering:

**UNIT II**

**FOUNDATION:** Functions of Foundation – Requirements of Good Foundation – Type of Foundation – Foundation Failures and Remedial Measures.

**MASONRY:** Definition of Terms Used in Masonry – Stone Masonry - Classification of Stone Masonry–Brick Masonry- English and Flemish Bonds in Brick Masonry–Defects in Brick Masonry

**UNIT III**

**FLOORS:** Components of Floor – Types of Floors: Cement Concrete Flooring - Marble Flooring - Tiled Flooring - Timber Flooring - Rubber Flooring.



**ROOFS:** Pitched, Flat and Curved Roofs - Lean-to-Roof, Coupled Roofs -Trussed Roofs- King and Queen Post Trusses

**DOORS AND WINDOWS:** Location of Doors and Windows-Types of Doors–Types of Windows.

#### **UNIT IV**

**LINTELS & ARCHES:** Classification of Lintels–Classification of Arches.

**PLASTERING AND POINTING:** Types of Mortars for Plastering – Methods of Plastering – Defects in Plastering – Pointing.

**STAIRS:** Technical terms – Requirements of Good Stair – Classification of Stairs.

#### **UNIT -V**

**PLANNING OF BUILDINGS:** Types of Buildings: Types of Residential Buildings – Site Selection for Residential Building - Green Buildings - Orientation of Buildings: Aspect; Prospect; Privacy; Furniture Requirement; Grouping; Circulation; Sanitation; Lighting; Ventilation; Cleanliness; Flexibility; Elegancy; Economy; Practical Considerations.

**BUILDING BYELAWS AND REGULATIONS:** Introduction – Terminology – Objectives of Building Byelaws - Minimum Plot Sizes - Open Space Requirements - Plinth Area, Floor Area, Carpet Area - Floor Area Ratio (FAR), Floor Space Index (FSI) - Areas for Different Units - Principles Underlying Building Byelaws - Built up Area Limitations – Height of Buildings - Wall Thickness - Lighting and Ventilation Requirement - Safety from Fire - Drainage and Sanitation - Applicability of the Byelaws.

#### **Text Books:**

- Elements of Civil Engineering, Saikia, Mimi Das, Bhargab Mohan, Das, Madan Mohan, PHI Learning Pvt. Ltd. New Delhi
- Building Planning, Designing and Scheduling, Gurcharan Singh, Standard Publisher Distributors
- Building Planning and Design, 8th Revised Edition, N. Kumaraswamy and A. Kameswara Rao, Charotar Publishing House Pvt. Ltd.,
- Building Construction, 11th Edition, Dr. B.C. Punmia, Dr. Ashok Kumar Jain, Dr. Arun Kumar Jain, Laxmi Publications.

#### **Reference Books:**

- Building by Laws by State and Central Governments and Municipal Corporations.
- National Building Code.
- Building Drawing with an Integrated Approach to Built Environment, 4th Edition, M. Shah, C. Kale, S. Patki, Tata McGraw Hill Education
- A Textbook on Building Construction, Dr. S.K. Sharma, S. Chand Publishers.

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**(18CE0103) INTRODUCTION TO SOLID MECHANICS**

**Course Objectives:**

- *To learn about simple stresses and strains and their applications.*
- *To learn how to find shear force and bending moment and construction of SFD & BMD.*
- *To understand about the concept of simple bending and shear stress distribution.*
- *To learn about deflections of Beams by using different methods.*
- *To learn about columns their applications.*

**Course Outcomes:**

*Students undergoing this course are able to:*

- *The students would be able to understand the behavior of materials under different stress and strain conditions.*
- *The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.*
- *The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams under various loading conditions*
- *Determine shear stress in the shaft subjected to torsional moments.*

**UNIT-I**

**SIMPLE STRESSES AND STRAINS:** Concept of stress and strain, St.Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains – Hooke's law– Factor of safety- Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

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

**UNIT-II**

**SHEAR FORCE AND BENDING MOMENTS:** Types of supports and beams – Shear force and bending moment diagrams for cantilever, simply supported and over hanging beams with point loads, uniformly distributed load, uniformly varying loads and couples – Relationship between bending moment, shear force and loading.

**THEORY OF SIMPLE BENDING:** Assumptions in the theory of simple bending – Derivation of bending equation:  $M/I = f/y = E/R$ .

**UNIT-III**

**SHEAR STRESS DISTRIBUTION:** Derivation of formula – Shear stress distribution in rectangular, triangular, circular, I and T sections.

**TORSION OF CIRCULAR SHAFTS AND SPRINGS:** Theory of pure torsion - Torsional theory applied to circular shafts – Power transmission - Close and open coiled helical springs under axial loads and axial twist – Carriage springs

**UNIT-IV**

**DEFLECTIONS OF BEAMS:** Relationship between moment, slope and deflection, Moment area method, Macaulay's method. Use of these methods to calculate slope and Deflection for determinant beams.

**UNIT-V**

**COLUMNS:** Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns – assumptions – derivation of Euler's critical load formulae for various end conditions.

**Text Books:**

1. Strength of Materials (Mechanics of Solids), 6<sup>th</sup> Edition, Dr. R.K. Rajput, S. Chand Publishing
2. A Textbook of Strength of Materials, 6<sup>th</sup> Edition, Dr. R. K. Bansal, Laxmi Publications.
3. An Introduction to the Mechanics of Solids. 2<sup>nd</sup> Edition, New York, NY: McGraw Hill, 1979.
4. Strength of Materials, fundamentals and applications, Dr. TD Gunneswara Rao, Cambridge University Press.

**References:**

1. Mechanics of Materials, Revised, 2016 Edition, Dr. B. C. Punmia, Dr. Ashok Dr. Jain, Dr. Arun Kumar Jain, Laxmi Publications
2. Strength of Materials, 3<sup>rd</sup> Edition, R. Subramanian, Oxford University Press
3. Strength of Materials, 24<sup>th</sup> Edition, R. S. Khurmi, S. Chand Publishing
4. Strength of Materials, 11<sup>th</sup> Edition, Sadhu Singh, Khanna Publishers

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**(18CE0104) INTRODUCTION TO FLUID MECHANICS**

**Course Objectives:**

- *To understand the basic concepts of Fluid properties and fluid statics.*
- *To understand the applications of fluid kinematics and dynamics.*
- *To understand the behavior of pipe flow and losses in pipe flow.*
- *To understand the concepts of flow measurements and boundary layer flows.*

**Course Outcomes:**

- *On completion of the course, the students will be able to:*
- *Determine the properties of fluid like pressure and their measurement.*
- *Apply continuity equation and energy equation in solving problems on flow through conduits.*
- *Compute the frictional loss in laminar and turbulent flows.*

**UNIT-I**

**FLUID PROPERTIES:** Dimensions and Units - Definition of a Fluid – Physical Properties of Fluids- Density, Specific Weight, Specific Volume, Specific Gravity, Compressibility, Vapour Pressure, Surface Tension and Capillarity and Viscosity

**FLUID STATICS:** Pascal’s Law - Pressure Variation in a Static Fluid – Atmospheric, Gauge and Absolute Pressures - Measurement of Pressure – Piezometer – U–Tube and Inverted U–Tube Manometers - Hydrostatic Forces on Plane and Curved Surfaces - Center of Pressure - Meta Centric Height - Buoyancy Forces

**UNIT-II**

**FLUID KINEMATICS:** Fluid Kinematics- Classification of Fluid Flow- Steady and Unsteady Flow; Uniform and Non-Uniform Flow; Laminar and Turbulent Flow; Rotational and Irrotational Flow; Compressible and Incompressible Flow; Ideal and Real Fluid Flow; One, Two and Three Dimensional Flows - Stream Line, Path Line, Streak Line and Stream Tube- Stream Function - Velocity Potential Function - One, Two and Three Dimensional Continuity Equations in Cartesian Coordinates

**UNIT-III**

**FLUID DYNAMICS:** Fluid Dynamics- Surface and Body Forces - Equations of Motion - Euler’s Equation – Bernoulli’s Equation - 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 - Analysis of Free Liquid Jets

**UNIT-IV**

**FLOW THROUGH PIPES:** Loss of Head Through Pipes - Darcy-Wiesbach Equation - Minor Losses - Total Energy Equation - Hydraulic Gradient Line - Pipes in Series - Pipes in Parallel - Equivalent Pipes - Siphon - Analysis of Pipe Networks ; Hardy Cross Method

**UNIT-V**

**LAMINAR FLOW:** Reynolds Experiment - Laminar Flow Through: Circular Pipes, Parallel Plates

**TURBULENT FLOW:** Definition - Causes of Turbulence - Velocity Distribution in Turbulent Flow in Pipes- Resistance of Smooth and Rough Pipes - Moody's Diagram

**Text Books:**

- Hydraulics and Fluid Mechanics Including Hydraulics Machines (A-4-Size), 20th Edition, Dr. P.N. Modi & Dr. S.M. Seth, Standard Book House
- A Textbook of Fluid Mechanics and Hydraulic Machines, 9th Edition, Dr. R. K. Bansal, Laxmi Publications

**References:**

- Fluid Mechanics, 9th Edition, Victor Streeter, E. Benjamin Wylie, K.W. Bedford, McGraw Hill Education
- Fluid Mechanics and Machinery, 1st Edition, C.S.P. Ojha, P.N. Chandamouli & R. Berndtsson, Oxford University Press
- Fluid Mechanics and Hydraulic Machines, 1st Edition, S. C. Gupta, Pearson India Education Services Pvt. Ltd.
- Fluid Mechanics and Machinery, 1st Edition, Rama Durgaiyah D., New Age International

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**(18CE0105) SOLID MECHANICS LAB**

**Course Objectives:**

- *To learn the testing procedures of mild steel by tension, direct shear, torsion, hardness tests*
- *To learn the concept of modulus elasticity, and to know how to measure deflection of beams*
- *To learn the compressive strength of wood, concrete stone and bricks*
- *To learn the testing procedures for clay bricks and comparison with BIS standard of brick*

**Course Outcomes:**

*After completion of the course the student will be able to:*

- *estimate Young's modulus, tensional rigidity of mild steel rods*
- *know the hardness of mild steel and HYSO specimens*
- *analyze the strength of wood, concrete, stone and bricks*
- *assess the quality of wood, concrete, stone and bricks*

**LIST OF EXPERIMENTS:**

**\*Cycle 1:**

1. Bending test on simple support beam.
2. Compression test on wood or Brick.
3. Impact test on metal specimen (Izod and Charpy)
4. Compression test on helical spring.
5. Tension test on mild steel rod.

**\*Cycle 2:**

6. Torsion test on mild steel rod.
7. Impact test.
8. Shear test.
9. Continuous beam – deflection test.
10. Hardness test on metals (Rockwell and Brinell Hardness Number Tests).
11. Verification of Maxwell's Reciprocal theorem on beams.

**LIST OF EQUIPMENT:**

1. UTM for conducting tension test on rods.
2. Brinnell's / Rock well's hardness testing machine.
3. Compression testing machine.
4. Izod Impact machine.
5. Steel beam for flexure test.
6. Beam setup for Maxwell's theorem verification.
7. Torsion testing machine.

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**(18CE0106) FLUID MECHANICS LAB**

**Course Objectives:**

- To learn the concepts of Venturimeter & Orifice meter
- To learn the concepts of notch's
- To learn the basic concepts of turbines
- To learn the basics concepts of different types of pumps.

**Course Outcomes:**

Students undergoing this course are able to

- Calibrate Venturimeter & Orifice meter
- Calculate losses in flows
- Estimate the efficiency of different pumps.
- Study the performance of different turbines.

**LIST OF EXPERIMENTS:**

**\*Cycle 1:**

1. Verification of Bernoulli's equation.
2. Calibration of Coefficient of discharge for Venturimeter.
3. Calibration of Coefficient of discharge for Orifice meter.
4. Calibration of Friction factor. (major losses experiment)
5. Determination of loss of head due to sudden contraction. (minor losses experiment)
6. Calibration of Discharge over Notches (Rectangular/Triangular Notch.)
7. Determination of Coefficient of discharge for a small orifice / mouthpiece by a constant head method / variable head method.

**\*Cycle 2:**

8. Impact of jet on vanes.
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Study on Hydraulic jump.
13. Performance test on Kaplan turbine

**\*Minimum Four experiments** must be conducted in the lab from each cycle

**LIST OF EQUIPMENT:**

1. Venturimeter Setup.
2. Orifice meter setup.
3. Friction factor and Minor losses test setup.
4. Impact of jets.

5. Pelton wheel and Francis turbines.
6. Centrifugal pumps.
7. Bernoulli's theorem setup.
8. Hydraulic jump test setup.
9. Kaplan turbine.
10. Rectangular and Triangular notch setups
11. Small orifice and mouth piece setup.



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**(18CE0107) COMPUTER AIDED BUILDING DRAWING****Course Objectives:**

- A Student will able to know how to apply engineering drawing using computers.
- A student can understand about the scope of Auto CAD software.
- A student will know what is plan and how it should draw in Auto CAD software.
- To learn about applications and advantages of Auto CAD.
- To learn about the basic commands of Auto CAD.

**Course Outcomes:**

- The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, and framed buildings using computer software's.
- Draw the symbols and plan of a residential building using Auto CAD Software.

**COURSE CONTENT:****1.0 Introduction to Computer Aided Drafting (CAD):**

- 1.1 About Auto CAD.
- 1.2 Computer graphics.
- 1.3 Definition of CAD.
- 1.4 Applications of CAD.
- 1.5 Advantages of CAD
- 1.6 Introduction to Auto CAD as drafting package.
- 1.7 Hardware requirements.

**2.0 Practice on Auto CAD:**

- 2.1 Graphical User Interface.
- 2.2 Study of drawing editor screen.
- 2.3 List out methods to access Auto CAD commands.
- 2.4 Practice of setting up of drawing area using utility commands & using setting commands.
- 2.5 Practice of File Management New, Open, Save, Save As, Export, Print, Publish, Drawing utilities, Units.
- 2.6 Practice of Geometrical commands line, Polyline, Circle, Erase, Oops, Snap, Arc, Ellipse, Polygon, Spline, Ellipse, Rectangle, and Donut.
- 2.7 Draw the given geometrical figures using draw commands
- 2.8 Practice of Modify Commands Move, Copy, Array, Break, Mirror, Offset, Scale, Rotate, Trim, Extend, Stretch, Solid, Fillet, Chamfer, Explode.
- 2.9 Draw the given figures using draw & Modifying commands.

- 2.10 Practice of Object Properties Color, Line type, Line weight.
- 2.11 Practice of view commands Zoom, Pan.
- 2.12 Practice of Drafting Settings.
- 2.13 Practice of Hatch, Gradient commands.
- 2.14 Practice of Block & insert commands.

### **3.0 Annotations:**

- 3.1 Practice of Text, Text Justifications, Multi Line text, Text style, Scale text, Spell.
- 3.2 Practice on Leader, Multi Leader and Leader settings.
- 3.3 Practices on Table.
- 3.3 Practice On Dimensioning, Dim Linear, Dim radius, Dim Aligned, Dim Diameter, Dim center, Dim Angular, Dim Baseline, Dim continue, Dim ordinate, Dimensional settings.
- 3.4 Utilities, Distance, Radius, Angle, Area, volume.
- 3.5 Layer properties, make object Layer current, Match, previous, Isolate and Un-Isolate, Freeze, Off, turn all layers on, thaw all layers, Lock, Unlock, Change to current Layer, Copy objects to new Layer, Layer Walk, Isolate to current View port, Merge, Delete, Locked Layer fading.
- 3.6 Practice Plans using Layers.

### **4.0 Geometric constructions:**

- 4.1 Practice on Point, DDP type, Divide, Measure.
- 4.2 Divide a given line into desired number of equal parts internally.
- 4.3 Draw tangent lines and arcs.
- 4.4 Construct a hexagon from the given data.
- 4.5 Construct ellipse, parabola, hyperbola, cycloid and helix.
- 4.7 Using CAD software draws & prints the following drawings.
- 4.7 Draw conventional signs as per I.S. Standards, Symbols used in civil engineering drawing.
- 4.8 Draw the important joinery components of the building like elevation of fully paneled double leaf door, elevation of partly glazed and partly paneled window.

### **5.0 Residential building:**

- 5.1 Plan, Elevation, Section of single roomed building.
- 5.2 Single storied bearing type residential building,
  - 5.2.1 One Bed Room House.
  - 5.2.2 Two Bed Room House.
- 5.3 Single storied framed structure type residential building,
  - 5.3.1 One Bed Room House.
  - 5.3.2 Two Bed Room House.
- 5.4 Drawing to be submitted for approval to corporate or municipality showing required details in one sheet such as,
  - 5.4.1 Plan-Showing Dimensions of all rooms.

- 
- 5.4.2 Section-Showing specifications and Typical Foundation Details.
  - 5.4.3 Elevation.
  - 5.4.4 Site Plan- Showing Boundaries of site and plinth Area, car parking, passages and location of septic tank.
  - 5.4.5 Key plan- Showing the location of building.
  - 5.4.6 Title block- Showing Signature of owner & Licensed surveyor's.

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**(18HS0804) ENVIRONMENTAL SCIENCES**

**Course Objectives:**

- *Students have got an idea about the importance of pollution free air, water, soil and food.*
- *They know about global environmental problems like Acid Rains, Global Warming, Green House Effects, Ozone layer depletion.*
- *To understand the impacts of developmental activities and mitigation measures along with the environmental policies and regulations.*
- *To recognize major concepts in environmental studies and demonstrate in-depth understanding the environment.*

**Course Outcomes:**

- *Based on this course, the Engineering Student will be able to understand/evaluate/develop technologies on the basis of Ecological principles and environmental regulations along with Legislation, Laws and Policies which in turn help in sustainable development.*
- *Take preventive measures to reduce air, water, soil pollutions and contaminants in food.*
- *Effectively carry out waste disposal at individual level.*
- *Involve in preservation of natural resources.*

**UNIT- I**

**INTRODUCTION:** Definition, Scope and Importance-Need for Public Awareness

**NATURAL RESOURCES:** Classification of resources-Forest resources: Use and over-exploitation, deforestation- Mining, dams and their effects on forests and tribal people – Water resources - Use and over utilization of surface and ground water- Floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources –Energy resources: Renewable and Non-Renewable sources of energy- Solar energy, Hydro electrical energy, Wind energy, Nuclear energy, etc.

**UNIT-II**

**ECOSYSTEMS:** Concept of an ecosystem– structural features of ecosystem- Producers, Consumers and Decomposers—Biogeochemical cycles- Ecological succession-Food chains, food webs and ecological pyramids – Energy flow in the ecosystem-Types of ecosystems (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems.

**UNIT-III**

**BIODIVERSITY AND ITS CONSERVATION:** Introduction, Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, India as a Mega-diversity Nation, Hot spots of biodiversity, Value of biodiversity, threats to biodiversity, endemic, endangered and extinct species of India, In-Situ and Ex-situ conservation of biodiversity.

**UNIT-IV****ENVIRONMENTAL POLLUTION AND GLOBAL ENVIRONMENTAL ISSUES:**

Natural Disasters: Droughts, Floods, Cyclone, Landslides, Earthquake, Pollution episodes: Air pollution, Water pollution, Land pollution, Noise pollution, Automobile pollution and nuclear pollution –Effects-Global warming, Acid Rain and Ozone layer depletion and controlling measures. Global Environmental Issues: Population Growth, Urbanizations, Land Management, Water and Waste Water Management. Climate change and impacts on human environment Solid Waste Management: causes, effects and control measures of Municipal solid wastes – E-waste and management, Role of an individual in prevention of pollution – pollution case studies.

**UNIT-V****ENVIRONMENTAL LEGISLATION, LAWS, POLICIES FOR SUSTAINABLE**

**DEVELOPMENT:** Environmental Legislation, Environmental Protection act – Air Prevention and Control of Pollution act–Water Prevention and control of Pollution act– Wildlife protection act – Forest conservation act – Municipal Solid Waste management, International conventions/Protocols: Earth summit, Kyoto protocol and Montreal Protocol. From Unsustainable to sustainable development, Role of NGO's for Sustainable development, Concepts of Green belt development, Role of IT in Environment-Remote Sensing and GIS methods for Sustainable development.

**Field work-** visit to a local area to document environmental assets-river forest grassland/hill, mountain and polluted sites (urban/rural/industrial/Agriculture) - study simple ecosystems (pond/river/hill slopes)

**Text Books:**

1. A.Kaushik and C.P.Kaushik, Environmental Sciences, 5<sup>th</sup> edition, new age international publishers, 2015.
2. Text Book of Environmental Science and Technology by M.Anji Reddy, BS Publications.

**References:**

1. Anil Kumar and Arnab Kumar De, Environmental Studies, New Age International Publishers, New Delhi, 3<sup>rd</sup> Edition 2015.
2. R.K. Trivedi, “Handbook of Environmental Laws, Rules, Guidelines, Compliances andStandards”, Vol.I and II, Enviro Media.
3. Environmental Studies by Dr.K.Mukkanthi, S.Chand Publishers.
4. Rajagopalan.R, “Environmental Studies-From Crisis to Cure”, Oxford University Press, 2005.
5. Erach Bharucha, 2010 “Text Book of Environmental Studies”, University Grants Commission, University Press (India) Pvt.Ltd., Hyderabad

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**(18ME0346) MECHANICAL ENGINEERING**

**Course Objectives:**

- *To understand the basic fundamentals of mechanical engineering.*
- *To study the laws of thermodynamics, Energy conversion devices, R&AC.*
- *To understand the principles of welding, manufacturing processes, Power transmission devices.*
- *To Know about Engineering Materials.*

**Course Outcomes:**

- *After completion of the course the student will be able to understand the fundamentals of mechanical engineering.*
- *Acquire the concept of laws of thermodynamics, Energy conversion devices, R&AC.*
- *Knows the principles of welding, manufacturing processes, Power transmission devices.*
- *Knows about Engineering Materials.*

**UNIT-I**

**Thermodynamics:** Entropy-Ideal and real gases-Ideal and real gas equations-Analysis of Carnot cycle-Otto cycle-Diesel cycle-Efficiency. Problems on cycles

**UNIT-II**

**Energy conversion devices:** Boilers-Steam turbines-Gas turbines-Working principle of 2stroke & 4stroke I.C. Engines (S.I & C.I)-Fuels-CRDI-MPFI-Hybrid Engines-Reciprocating pumps-Centrifugal pumps-Hydraulic turbines.

**UNIT-III**

**Refrigeration & Air conditioning:** Vapour compression refrigeration system-Heat pump-COP-Study of household refrigerator-Energy efficiency rating-Psychometry -Psychrometric processes-Window Air conditioner-Split Air conditioner-Refrigerants and their impact on environment.

**UNIT-IV**

**Materials:** Engineering materials-classification-properties-Alloys & applications

**Power transmission devices:** Belt and belt drives-Chain drive-Rope drive-Gears and gear trains-Friction clutch (Cone & Single plate)-Brakes-Types & Applications.

**UNIT-V**

**Manufacturing Processes:** Casting-Sheet metal forming-Sheet metal cutting-Forging-Rolling-Extrusion-Metal joining processes-Soldering-Brazing-Welding-Powder metallurgy.

**General Manufacturing Machines (Basic elements, working principle & types of operations):** Lathe-Drilling-Shaper-Planer-Slotter-Milling-Grinding-Introduction to CNC machines.

**Text Books:**

1. Engineering Thermodynamics, P.K Nag, TMH Publishers, New Delhi, 5<sup>th</sup> Edition, 2013.
2. Refrigeration and Air conditioning, C.P.Arora & Domkundwar, 3<sup>rd</sup> edition, McGraw Hill, New Delhi, 2010.
3. Manufacturing Technology Foundry, Forming and Welding, P.N. Rao, 4th Edition, Tata Mc Graw Hill, 2003

**Reference Books:**

1. Principles of Refrigeration, Roy J. Dossat, 4th edition, Pearson Education Asia, 2009.
2. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen, John Wiley & sons (ASIA) Pte Ltd, 7<sup>th</sup> Edition, 2009.

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**(18CE0108) ENGINEERING GEOLOGY**

**Course Objectives:**

- *The objective of this is to give the basic knowledge of geology that is required for construction of various civil engineering structures.*
- *The syllabus includes the basics of geology. Geological hazards and gives a suitable picture on the geological aspects that are to be considered for the planning and construction of major civil engineering projects.*
- *It involves the collection, analysis, and interpretation of geological data and information required for the safe development of civil works.*

**Course Outcomes:**

- *This course helps to know the identification of rocks, minerals, engineering geology problems and also basics of earth science.*
- *Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice*

**UNIT - I**

**INTRODUCTION:** Introduction-Branches of Geology Useful to Civil Engineering- Scope of Geological Studies in Various Civil Engineering Projects- Physical Geology- Weathering, Erosion and Denudation- Factors Affecting Weathering and Product of Weathering - Weathering of Common Rock like “Granite”

**UNIT - II**

**MINERALOGY:** Mineral, Origin and Composition- Study of Various Properties for the Identification of Minerals - Different Methods of Study of Minerals - Advantages of Study of Minerals by Physical Properties- Rock Forming Minerals- Megascopic Identification of Common Primary & Secondary Minerals

**UNIT - III**

**PETROLOGY:** Origin and Formation of Rocks - Classification of Rocks - Igneous, Sedimentary and Metamorphic rocks - Their Textures and Structures - Study of Rocks like Granite, Gabbro, Dolerite, Basalt, Breccia, Conglomerate, Sand Stone, Shale, Limestone, Laterite, Quartzite, Schist, Gneiss, Marble, Slate

**UNIT - IV**

**STRUCTURAL GEOLOGY:** Strength Behavior of Rocks- Stress and Strain in Rocks - Elements of Structural Geology like Strike, Dip, and Outcrop - Study of Folds, Joints, Faults, Unconformities and Their Importance in Civil Engineering Works

**GROUND WATER:** Ground Water- Water Table - Common Types of Ground Water - Ground Water Exploration



**UNIT - V**

**EARTH QUAKES & LAND SLIDES:** Earth Quakes - Causes and Effects of Earth Quakes - Seismic Waves- Richter scale - Precautions to be taken for Building Construction in Seismic Areas - Landslides - Their Causes and Effect - Measures to be taken to Prevent Their Occurrence

**GEOLOGY OF DAMS, RESERVOIRS AND TUNNELS:** Geology of Dams - Geological Considerations in the Selection of a Dam and Reservoir - Tunnels Purposes of Tunneling - Effects of Tunneling on the Ground - Role of Geological Considerations in Tunneling Over Break and Lining in Tunnels

**Text Books:**

1. Engineering Geology by N. Chennkesavulu, Mc-Millan, India Ltd.
2. Engineering geology by Prabin singh, Katson Publications
3. Engineering geology by vasudev kanthi, Universities press, Hyderabad.
4. Engineering Geology by D. Venkata Reddy, Vikas Publications, New Delhi.

**Reference Books:**

1. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
2. Geology for Geotechnical Engineers, J.C.Harvey, Cambridge University Press (1982).
3. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
4. Fundamental of Engineering Geology Butterworths by F.G. Bell, Publications, New Delhi.

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**(18CE0109) SURVEYING & GEOMATICS**

**Course Objectives:**

- *To describe the function of surveying in civil engineering construction*
- *To train the students on the basic principles of surveying for the measurement of distances and areas*
- *To measure bearing of a line with prismatic compass and horizontal angles between the lines and vertical angles of elevated or depressed objects by transit theodolite*
- *Calculate, design and layout horizontal and vertical curves, Understand, interpret, and prepare plan, profile, and cross-section drawings.*
- *To apply for horizontal and vertical distance computation by tachometry survey*
- *To set out the different types of curves in the field*

**Course Outcomes:**

*The course will enable the students to:*

- *Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities*
- *Translate the knowledge gained for the implementation of civil infrastructure facilities.*
- *To be in a position to apply the basic principle of surveying and usage of surveying instruments in all civil engineering activities, including the construction of buildings, bridges, roads and high ways, pipe lines, dams, ports and harbours*
- *To be an expert of demarcation of ownership and / or delimitation of land, property, etc., through surveying process*
- *Surveying techniques to collect data for planning, designing and execution, able to employ green field*
- *Use total station and able to assess the electromagnetic distances*

**UNIT-I**

**PRINCIPLES OF SURVEYING:** Surveying – Definition; Primary Divisions, Classification- Principles of Surveying - Scales used for Maps and Plans - Duties of a Surveyor - Errors: Accuracy and Precision - Sources and Types of Errors.

**ANGLES, AZIMUTHS AND BEARINGS:** Units of Angle Measurement - Meridians, Azimuths Bearings - Magnetic Declination, Local Attraction and Corrections to Angles and Bearing of Lines.

**TYPES OF SURVEYING:** Introduction to Chain, Compass and Plane Table Survey.

**UNIT-II**

**LEVELLING:** Introduction - Basic definitions - Methods of Leveling - Leveling Instruments: Dumpy Level, Leveling Staff - Temporary Adjustments of Dumpy Level - Theory of Simple and Differential Leveling - Level Field Book - Classification of Direct Leveling Methods – Reciprocal Leveling - Profile Leveling - Cross Sectioning - Curvature and Refraction - Difficulties in Leveling - Errors in Leveling - Degree of Precision.

**CONTOURING:** Introduction - Contour Interval - Characteristics of Contours - Methods of Locating Contours - Direct and Indirect Methods - Interpolation and Sketching of Contours - Contour Gradient- Uses of Contour Maps.

**UNIT-III**

**THEODOLITE:** Vernier Theodolite: Basic Definitions - Fundamental Lines and Desired Relations - Temporary Adjustments - Measurement of a Horizontal Angle - Repetition and Reiteration Methods of Horizontal Angle Measurement - Measurement of Vertical Angle - Sources of Errors in Theodolite Survey – Traversing - Omitted Measurements - Closing Error - Determination of the Level of the Top of an Object, When its base is accessible and inaccessible- Determination of the Height of the Object When the Two Instrument Stations are not in the Same Vertical Plane.

**TACHEOMETRIC SURVEYING:** Definitions - Advantages of Tachometric Surveying -Basic Systems of Tachometric Measurement - Determination of Constants K and C – Inclined Sight with Staff Vertical - Inclined Sight with Staff Normal to the Line of Sight - Movable Hair Method – Tangential Method.

**UNIT-IV**

**CURVES:** Simple Curves – Definitions and Notations - Designation of a Curve - Elements of Simple Curves - Methods of Setting Simple Curves: Rankine’s method, Two Theodolite Method- Compound curves – Elements of Compound Curve - Reverse Curve – Elements of Reverse Curve - Relationship between Various Elements.

**UNIT-V**

**ELECTRONIC DISTANCE MEASUREMENTS:** Introduction – Basic Concepts- Electromagnetic Waves - Basic Definitions - Phase of the Wave, Units, and Types of waves - Distance from Measurement of Transit Time - Computing the Distance from the Phase Differences - EDM instruments - Electronic Theodolite - Total Station: Models, Fundamental Measurements, Recording, Traversing, and Data Retrieval.

**Text Books:**

- Surveying Vol-I, 16th Edition, Punmia B. C, Laxmi Publications.
- Surveying Vol-II & III, 15th Edition, Punmia B.C, Laxmi Publications.
- Surveying and Leveling, 2nd Edition, Basak N.N, Tata McGraw Hill Publishing Company Ltd.

**References:**

- Surveying and levelling part I & II, 23rd Edition, Kanetkar.T.P. & S.V. Kulkarni, Puna Vidyarathi Girha, Prakashan

- Fundamentals of Surveying and Levelling, 1st Edition, R. Subramanian, Oxford University Press, India
- Surveying Vol-I, 10th Edition, Arora K. R, Rajsons Publications Pvt. Ltd.

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**(18CE0110) MATERIALS, TESTING & EVALUATION**

**Course Objectives:**

- To introduce traditional and modern construction materials.
- To impart knowledge of building components.
- To impart knowledge of construction practices.

**Course Outcomes:**

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

- Understand properties of various construction materials and their manufacturing process.
- Access the quality of construction materials.
- Supervise the construction activities.
- Introduction to Engineering Materials covering

**UNIT - I**

**STONES:** Classification of rocks – Quarrying of stones: tools, methods, precautions – Uses of stones – Characteristics of good building stones.

**BRICKS:** Classification of bricks – Characteristics of good bricks – Ingredients of good brick earth – Harmful substances in brick earth – Manufacturing of bricks – Defects in bricks.

**WOOD:** Classification of trees – Classification of timber – Structure of timber – Characteristics of good timber – Seasoning of timber – Defects, diseases and decay of timber.

**UNIT - II**

**CEMENT:** Properties of cement – Composition of ordinary cement – Manufacturing of ordinary cement - field tests on cement – Laboratory tests on cement – Storage of cement.

**PAINTS & DISTEMPERS:** Composition of oil paint – Preparation of paint – Painting plastered surfaces – Painting wood surfaces – Painting metal surfaces – Defects – Distemper – White wash and color wash – Varnish.

**MISCELLANEOUS MATERIALS:** Pig iron – Cast iron – Steel – Glass – Asbestos – Gypsum – Rubber.

**UNIT - III**

**BITUMEN:** Bitumen and asphaltic materials - Tests & testing of bitumen & bituminous mixes.

**AGGREGATES:** Classification of Aggregate, M-Sand, Tests & testing of sand- Mechanical Properties of Coarse Aggregate.

**UNIT - IV**

**CONCRETE:** Workability – Factors Affecting Workability – Measurement of Workability by Different Tests – Setting Times of Concrete - Segregation & Bleeding – Mixing and Vibration of Concrete.

**SPECIAL CONCRETE:** Plain, Reinforced and steel fibre/ Glass fibre-reinforced Concrete, light-weight concrete, High Performance Concrete, Polymer Concrete- Ceramics, and Refractories, Tests & testing of concrete.

#### **UNIT - V**

#### **MECHANICAL BEHAVIOR AND MECHANICAL CHARACTERISTICS:**

Elasticity – principle and characteristics; Plastic deformation of metals; tensile test – Standards for different material (brittle, quasi-brittle, elastic and so on) True stress – strain Interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic; Internal friction, creep – fundamentals and characteristics; Brittle fracture of steel – Temperature transition approach

#### **Text Books:**

1. Building Materials, 4th Edition, Duggal, S.K., New Age International
2. Building Construction, 11<sup>th</sup> Edition, Dr. B.C. Punmia, Dr. Ashok Kumar Jain, Dr. Arun Kumar Jain, Laxmi Publications.
3. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004.

#### **References:**

1. Engineering Materials [Material Science], 42nd Edition, Rangwala, Charotar Publishing House Pvt. Ltd.
2. A Textbook on Building Construction, Dr. S.K. Sharma, S. Chand Publishers.

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**(18CE0111) MECHANICS OF SOLIDS**

**Course Objectives:**

- *To understand the applications of thin cylinders and thick cylinders*
- *To understand the direct and bending stress in beams.*
- *To learn application of Castiglione's theorems 1 & 2 for beams and trusses.*
- *To learn and analyze fixed beam*
- *To learn and analyze continuous beams by Clapeyron's theorem of three moments*
- *To learn and analyze continuous beams and frames by slope deflection method, and Moment distribution*

**Course Outcomes:**

*The course will enable the students to:*

- *Determine different stresses developed in thin and thick cylinders*
- *Determine the behaviour of direct and bending stress in beams*
- *Have knowledge in structural engineering*
- *Understand the application of Castiglione's theorem.*
- *Analyse continuous beams and portal frames by slope deflection method and moment distribution method.*

**UNIT-I**

**THIN CYLINDERS & THICK CYLINDERS:** Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – Hoop, longitudinal and volumetric strains – Changes in dia, and volume of thin cylinders – Thin spherical shells - Introduction Lamé's theory for thick cylinders – Derivation of lamé's formulae – Distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

**UNIT-II**

**DIRECT AND BENDING STRESS:** Stresses under the combined action of direct loading and bending moment - Core of a section – Determination of stresses in the case of chimneys, retaining walls and dams – Conditions for stability – Stresses due to direct loading and bending moment about both axes.

**UNSYMMETRICAL BENDING:** Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis – Deflection of beams under unsymmetrical bending.

**UNIT III**

**INTRODUCTION:** Introduction to the Analysis of Structural Systems - Determinate and Indeterminate Structures - Concepts of Energy Principles, Strain Energy Due to Axial Load, Bending Moment and Shear Forces - Maxwell's, Betti's Theorems - Castigliano's First and Second Theorem and Unit Load Method - Deflection of Simple Beams and Pin-Jointed Trusses.

**UNIT - IV**

**ANALYSIS OF FIXED BEAMS:** Fixed Beams with UDL, Point Loads, Uniformly Varying Load, Couple - Shear Force and Bending Moment Diagrams - Deflections - Effect of Sinking of Support.

**ANALYSIS OF CONTINUOUS BEAMS:** Clapeyron's Theorem of Three Moments – Derivation of Theorem – Application to Continuous Beams with Point Load, Eccentric Load, Uniformly Distributed Load and Couple – Sinking of Supports – Shear Force and Bending Moment Diagrams.

**UNIT - V**

**SLOPE DEFLECTION METHOD:** Slope Deflection Equation - Application to Continuous Beams with Degree of Indeterminacy Not Exceeding Three, Effect of Sinking. - Analysis of Single Bay and Single Storey Portal Frames with and without Sway.

**MOMENT DISTRIBUTION METHOD:** Stiffness and Carry Over Factors - Distribution Factors – Analysis of Continuous Beams Degree of Indeterminacy Not Exceeding Three, Effect of Sinking - Analysis of Single Bay and Single Storey Portal Frames with and without Sway

**Text Books:**

1. Strength of Materials (Mechanics of Solids), 6<sup>th</sup> Edition, Dr. R.K. Rajput, S. Chand Publishing
2. A Textbook of Strength of Materials, 6<sup>th</sup> Edition, Dr. R. K. Bansal, Laxmi Publications.
3. An Introduction to the Mechanics of Solids. 2<sup>nd</sup> Edition, New York, NY: McGraw Hill, 1979.
4. Theory of structures by Ramamuratham, Jain book depot, New Delhi.
5. Analysis of structures by Vazrani & Ratwani, Khanna Publications.
6. Strength of Materials, fundamentals and applications, Dr. TD Gunneswara Rao, Cambridge University Press.

**References:**

1. Mechanics of Materials, Revised, 2016 Edition, Dr. B. C. Punmia, Dr. Ashok Dr. Jain, Dr. Arun Kumar Jain, Laxmi Publications
2. Strength of Materials, 3<sup>rd</sup> Edition, R. Subramanian, Oxford University Press
3. Strength of Materials, 24<sup>th</sup> Edition, R. S. Khurmi, S. Chand Publishing
4. Strength of Materials, 11<sup>th</sup> Edition, Sadhu Singh, Khanna Publishers



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**(18CE0112) ENGINEERING GEOLOGY LAB**

**Course Objectives:**

- *Study of physical properties and identification of minerals referred under theory.*
- *Megascopic description and identification of rocks referred under theory.*
- *Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.*
- *Simple Structural Geology problems.*

**Course Outcomes:**

*After completion of this lab the student:*

- *Can conduct macroscopic tests on rack forming minerals to identify*
- *Can conduct macroscopic tests on rocks to identify*
- *Can be in position to interpret geological models*
- *Can perform strike and dip problems*

**LAB EXAMINATION PATTERN:**

1. Description and Identification of SIX Minerals
2. Description and Identification of Six  
(Including Igneous, Sedimentary and Metamorphic Rocks)
3. Interpretation of a Geological Map of a Geological Section
4. Simple Strike and Dip Problems

**Text books:**

1. Elementary Exercises in Geology by CVRK Prasad, Universities press.

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**(18CE0113) SURVEYING LAB – I**

**Course Objectives:**

- *To train the students in plotting of land by chain and tape plan table surveys*
- *To train the students in determine distance between two inaccessible points by prismatic compass and plane table and theodolite methods*
- *To train the students in plotting of contour maps by conducting leveling survey and total station and tachometric methods*

**Course Outcomes:**

*After completion of the course the student will be able to:*

- *Gain knowledge and expertise in operation of various survey instruments for computation of area of a land.*
- *Successfully carry out survey work in all civil Engineering projects, including the construction of buildings, roads and highways, rail track laying with curves, pipe lines, dams, ports and harbor as well as delimitation of land and property, etc.*

**LIST OF EXPERIMENTS:**

**\*Cycle 1:**

1. Survey of an area by chain survey (Closed traverse) & Plotting.
2. Chaining across obstacles.
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (Closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane Table survey.

**\*Cycle 2:**

6. Two point and three point problems in plane table survey.
7. Traversing by plane table survey.
8. Compound leveling (differential leveling).
9. An exercise of L.S. and C.S. and plotting.
10. Contour survey of reservoir.
11. Contour survey of a highway.

**LIST OF EQUIPMENT:**

1. Chains, tapes, ranging rods, cross staff, arrows.
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses.
4. Leveling instruments and leveling staves.

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**(18HS0817) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**

**Course objective**

*The course aims at imparting basic principles of thought process, reasoning and inference. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. 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. The course focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.*

**Course Contents**

- *Basic structure of Indian Knowledge System: Astadash Vidya- 4 ved*
- *4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi.,)*
- *6 Vedanga (Shisha, Kalppa, Nirukha, VYkaran, Jyothish & Chand)*
- *4 Upanga (Dharma Shastra, Meemamsa, Purana & Tharka Shastra)*
- *Modern Science and Indian Knowledge System*
- *Yoga and Holistic Health care*
- *Case studies*
- *Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain & Boudh*
- *Indian Linguistic Tradition –(Phonology, morphology, syntax and semantics)*
- *Indian Artistic Tradition - Chitra kala, Moorthi kala, Vasthu kala , Sthapthya, Sangeetha, Nruthya Yevam Sahithya*
- *Case studies*

**References:**

1. V. Sivaramakrishnan (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. Swami Jitatmanand, *Holistic Science and Vedant*, Bharatiya Vidya Bhavan
4. Fritzo Capra, *Tao of Physics*
5. Fritzo Capra, *The Wave of life*
6. VN Jha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay
7. Foundation, Velliarnad, Arnakulam
8. *Yoga Sutra of Patanjali*, Ramakrishna Mission, Kolkata
9. GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with Vyasa Bhashya*, Vidyanidhi Prakashan, Delhi 2016

10. RN Jha, *Science of Consciousness Psychotherapy and Yoga Practices*, Vidyanidhi Prakashan, Delhi 2016
11. P B Sharma (English translation), *Shodashang Hridayan* V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
12. S.C. Chatterjee & D.M. Datta, *An Introduction to Indian Philosophy*, University of Calcutta, 1984
13. K.S. Subrahmanialyer, *Vakyapadiya of Bhartrihari, (Brahma Kanda)*, Deccan College Pune 1965
14. *Panini Shiksha*, MotilalBanarasidas V.N. Jha, *Language, Thought and Reality*, Vasudevasharan AGRAWAL Kala yevam Samskruthi, Shithya Bhavan Elahabad, 1952
15. Pramod Chandra, *India Arts*, Howard Univ. Press, 1983
16. Krishna Chaitanya, *Arts of India*, Abhinav Publications, 1987
17. R. Nagaswamy, *Foundations of Indian Art*, Tamil Arts Academy, 2002

**Pedagogy:** Problem based learning, group discussions, collaborative mini projects.

**Outcome:** Ability to understand, connect up and explain basics of Indian traditional Knowledge in modern scientific perspective.