COURSE STRUCTURE

&

SYLLABUS

Programme:

B.Tech. – Civil Engineering

Regulation: R16

Applicable for the students admitted from the Academic Year 2016-17 onwards

ASCET
Originating the
Bright Careers
AUDISANKARA

AUDISANKARA
COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institute Affiliated to JNTUA, Ananthapuram & Accredited by NAAC with 'A' Grade

NH5 Bypass Road, Gudur, SPS Nellore (Dt.)

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B.Tech. - Civil Engineering

Course structure

(Applicable for the batches joining from 2016-17 onwards)

B.Tech- 1st Semester:

S.No	Code	Course	L	T	P	Drg	C
1	16HS1101	Professional English-I	3	0	0	0	3
2	16HS1102	Calculus and Differential Equations	3	1	0	0	3
3	16HS1104	Applied Chemistry	3	1	0	0	3
4	16CS1101	Computer Programming	3	1	0	0	3
5	16ME1101	Engineering Mechanics	3	0	0	0	3
6	16CS2102	Computer Programming Lab	0	0	3	0	2
7	16HS2108	Applied Chemistry Lab	0	0	3	0	2
8	16ME2104	Engineering Workshop and IT Workshop	0	0	3	0	2
		TOTAL	15	03	09	0	21

B.Tech- 2nd Semester:

S.No	Code	Course	L	T	P	Drg	C
1	16HS1201	Professional English-II	3	0	0	0	3
2	16HS1202	Integral Transformations	3	1	0	0	3
3	16HS1103	Applied Physics	3	1	0	0	3
4	16HS1105	Environmental Studies	3	0	0	0	3
5	16EE1201	Basic Electrical and Mechanical Engineering	3	1	0	0	3
6	16HS2106	Professional English Lab	0	0	3	0	2
7	16HS2107	Applied Physics Lab	0	0	3	0	2
8	16ME2103	Engineering Drawing Practice	0	0	0	3	2
		TOTAL	15	03	06	03	21

B.Tech- 3rd Semester:

S.No	Code	Course	L	T	P	Oth	C
1	16HS1302	Probability and Statistics	3	1	0	0	3
2	16CE1301	Building Materials, Planning and Construction	3	0	0	0	3
3	16CE1302	Strength of Materials-I	3	1	0	0	3
4	16CE1303	Fluid Mechanics	3	1	0	0	3
5	16CE1304	Surveying-I	3	1	0	0	3
6	16CE1305	Engineering Geology	3	0	0	0	3
7	16CE2306	Strength of Materials Lab	0	0	3	0	2
8	16CE2307	Engineering Geology Lab	0	0	3	0	2
9	16CE2308	Survey lab –I	0	0	3	0	2
10	16AS3301	Communication Skills Practice	0	0	0	3	1
11	16AS3302	Professional Society Activities-I	0	0	0	3	1
		TOTAL	**18**	**04**	**09**	**06**	**26**

B.Tech- 4th Semester:

S.No	Code	Course	L	T	P	Oth	C
1	16HS1401	Matrices and Numerical Methods	3	1	0	0	3
2	16CE1401	Strength of materials-II	3	1	0	0	3
3	16CE1402	Hydraulics and Hydraulic Machinery	3	1	0	0	3
4	16CE1403	Surveying-II	3	1	0	0	3
5	16CE1404	Concrete Technology	3	0	0	0	3
6	16CE1405	Environmental Engineering	3	1	0	0	3
7	16ME2307	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	0	2
8	16CE2406	Concrete Technology Lab	0	0	3	0	2
9	16CE2407	Survey Lab-II	0	0	3	0	2
10	16AS3401	Technical Seminar	0	0	0	3	1
11	16AS3402	Soft Skills Practice	0	0	0	3	1
12	16AS3403	Professional Society Activities-II	0	0	0	3	1
		TOTAL	**18**	**05**	**09**	**09**	**27**

B.Tech- 5th Semester:

S.No	Code	Course	L	T	P	Oth	C
1	16CE1501	Basics of Structural Analysis	3	0	0	0	3
2	16CE1502	Basic Reinforced Concrete Design	3	1	0	0	3
3	16CE1503	Soil mechanics-I	3	1	0	0	3
4	16CE1504	Hydrology & Irrigation Structures	3	1	0	0	3
5	16CE1505	Transportation engineering-I	3	1	0	0	3
6	16CE1506	Estimation costing and valuation	3	0	0	0	3
7	16CE2507	Soil mechanics Lab	0	0	3	0	2
8	16CE2508	Computer Aided Drafting Lab	0	0	3	0	2
9	16CE2509	Environmental Engineering Lab	0	0	0	3	2
10	16AS3501	Term Paper	0	0	0	3	1
11	16AS3502	Qualitative Aptitude	0	0	0	3	1
12	16AS3503	Professional Society Activities-III	0	0	0	3	1
		TOTAL	**18**	**04**	**06**	**12**	**27**

B.Tech- 6th Semester:

S.No	Code	Course	L	T	P	Oth	C
1	16CE1601	Methods of Structural Analysis	3	1	0	0	3
2	16CE1602	Soil Mechanics-II	3	1	0	0	3
3	16CE1603	Design of Steel Structures –I	3	1	0	0	3
4	16CE1604	Transportation Engineering-II	3	0	0	0	3
5		Elective-I					
	16CE1605	1. Municipal Solid Waste Management	3	1	0	0	3
	16CE1606	2. Steel-Concrete Composite Structures					
	16CE1607	3. Urban Transportation Planning					
	16CE1608	4. Available Selected MOOCs					
6		Elective-II					
	16CS1506	1. Construction & Law	3	1	0	0	3
	16CE1609	2. Environmental Impact Assessment & Audit					
	16CE1610	3. Repair and Rehabilitation of Structures					
	16CE1611	4. Available Selected MOOCs					
7	16CE2612	Building Planning & Drawing Practice Lab	0	0	3	0	2
8	16CE2613	Irrigation Design Practice Lab	0	0	3	0	2
9	16CE2614	Design and Drawing of Environmental Engineering	0	0	3	0	2
10	16CE2615	Mini Project	0	0	3	0	2

11	16AS3601	Technical Aptitude	0	0	0	3	1
12	16AS3602	Professional Society Activities-IV	0	0	0	3	1
		TOTAL	**18**	**05**	**12**	**06**	**28**

B.Tech- 7th Semester:

S.No	Code	Course	L	T	P	Oth	C
1	16CE1701	Advanced Reinforced Concrete Design	3	1	0	0	3
2	16CE1702	Design of Steel Structures -II	3	1	0	0	3
3	16CE1703	Transportation Engineering-II	3	1	0	0	3
4		Elective-III (Open Elective)					
	16CE1704	1. Disaster Management	3	1	0	0	3
	16CE1705	2. Infrastructure Systems Planning					
	16ME1704	3. Industrial Robotics					
5		Elective-IV					
	16CE1706	1. Prestressed Concrete	3	1	0	0	3
	16CE1707	2.Advanced Foundation Engineering					
	16CE1708	3. Earthquake Engineering					
	16CE1709	4. Available Selected MOOCs					
6	16CE2710	Computer Aided Analysis & Design Lab	0	0	3	0	3
7	16CE2711	Transportation Engineering Lab	0	0	3	0	3
8	16CE2712	MAT LAB	0	0	3	0	2
9	16AS3701	Internship	0	0	0	3	2
10	16AS3702	Professional Society Activities-V	0	0	0	3	1
		TOTAL	**15**	**05**	**09**	**06**	**24**

B.Tech- 8th Semester:

S.No	Code	Course	L	T	P	Oth	C
1	16CE1801	Water Resource Engineering	3	1	0	0	3
2		Elective-V					
	16CE1802	1. Bridge Engineering	3	1	0	0	3
	16CE1803	2.Geographic Information & Remote Sensing					
	16CE1804	3. Ground Improvement Techniques					
	16CE1805	4. Available Selected MOOCs					
3		Elective-VI					
	16CE1806	1. Finite Element Methods in Civil Engineering	3	1	0	0	3
	16CE1807	2. Construction Project Management					
	16CE1808	3. Pollution control and Monitoring					

	16CE1809	4. Available Selected MOOCs					
4	16CE2810	Project Work and Comprehensive Viva-Voce	0	0	8	0	12
		TOTAL	**09**	**03**	**08**	**0**	**21**

B.Tech- Civil Engineering

SYLLABUS

(Applicable for the batches joining from 2016-17 onwards)

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR
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B.Tech - I Semester:	L	T	P	[C]
	3	0	0	[3]

(16HS1101) PROFESSIONAL ENGLISH – I

Objectives:

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To train the students to use language effectively and to expose the students to a varied blend of self-instructional, learner – friendly mode of language learning.
3. To improve the students' proficiency in English at all levels.
4. To identify and analyze productive skills (speaking and writing) and receptive skills (listening and reading) of English Language for effective communication and practice.

Outcomes:
After the completion of the course, the students' would have/ be able to:
1. Developed functional skills for Professional practice through English.
2. Gained the ability to effectively communicate with members of society in general and engineering community in particular.
3. Inculcated an attitude to upgrade competence of English knowledge and communication.
4. Acquired fundamental and functional knowledge of English language, grammar and communication skills.
5. Identify and analyze productive skills and receptive skills.

UNIT – I:

The Road Not Taken by **Robert Frost**
Communication: Importance of Communication – Language as a tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing), vocabulary words, prefixes, suffixes, common errors, Verbal and Non-Verbal communication.

UNIT – II:

Fare Well Party for Miss Pushpa T.S. by **Nissim Ezekiel**
Writing: Effective Sentence construction strategies – Grammaticality, removing ambiguity in sentences.

UNIT – III:

No Men are Foreign by **James Kirkup**
Reading: Reading – Intensive and Extensive, Skimming, Scanning, paragraph writing, unity of theme, coherence, pattern of paragraph development.

UNIT – IV:

Exercises on Letter Writing and Technical Report Writing
Remedial Grammar: Tenses, Use of Articles and Prepositions, Voice, Reported Speech.

TEXT BOOKS:
1. **Text: Vibrant English 2014 Orient Black Swan**

2. Meenakshi Raman and Sangeetha Sharma, **Technical Communication**, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. M. Ashraf Rizvi, **Effective Technical Communication**, Tata McGraw–Hill, Publishing Company Limited, First Edition, 2005.

2. Martin Hewings, **Advanced English Grammar: A Self Study Reference and Practice Book for Advanced South Asian Students,** Cambridge University press, First South Asian Edition, New Delhi, 1999.

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B.Tech-I Semester (CE)	**L**	**T**	**P**	**[C]**
	3	**1**	**0**	**[3]**

(16HS1102) CALCULUS AND DIFFERENTIAL EQUATIONS

OBJECTIVES:
To Enable the Students

1. To comprehend the knowledge of maxima and minima of a function.
2. To understand the methods and techniques of concepts of curvature.
3. To evaluate areas and volumes of objects using multiple integrals.
4. To identify various types of differential equations and methods to solve
5. To apply differential equations in solving the problems of various engineering disciplines

OUTCOMES:

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

1. Find the solutions for maxima and minima problems which appear in engineering problems
2. Understand the concepts of curvature and use them in various engineering disciplines.
3. Evaluate areas and volumes using multiple integrals
4. Gain the knowledge of vector differentiation and solve the problems of various engineering disciplines acquire the knowledge of differential equations
5. Summarize and utilize them in various Engineering Problems.
6. Form and solve various PDEs

UNIT I Functions of Several variables

Functions of two or more variables – Partial Derivatives – Total derivative – Jacobians – Taylor's theorem for functions of two variables (without proof) – Maxima and Minima of functions of two variables and Lagrange's method of undetermined multipliers

UNIT II Curvature and Multiple Integrals

Curvature – Radius of Curvature for Cartesian and Polar Curves - Radius of Curvature at the origin - Evaluation of Double Integrals – Change of Order of Integration - Change of Variables - Evaluation of Triple Integrals Areas and Volumes using multiple integrals

UNIT III Vector Calculus

Differentiation of vectors – Gradient – Divergence – Curl – Line Integral - Gauss's Divergence Theorem, Green's theorem in a plane , Stoke's Theorem (without proofs)

UNIT IV   Differential Equations (0DE & PDE)

Differential equations of first order - Exact, linear and Bernoulli equations - Orthogonal trajectories, Newton's cooling, law of growth and decay- Illustrations.

Differential equations of second and higher order- with RHS terms e^{ax}, Sin ax / Cos ax, x^n (n is +ve integer), e^{ax} V [V is sin ax or cos ax or polynomial in x], x^n V [V is sin ax/ cos ax] - Variation of parameters - Applications to Oscillatory Electrical Circuits – Formation of PDEs by the elimination of arbitrary constants and arbitrary functions-Method of separation of variables

TEXT BOOKS

1. Higher Engineering Mathematics - Dr. B.S. Grewal – 42nd Edition - Khanna Publications
2. A Text Book of Engineering Mathematics – I - T.K.V. Iyengar, B. Krishna Gandhi and Others - S. Chand & Company – Revised edition 2013

REFERENCE(S)

1. Advanced Engineering Mathematics – E. Kreyzig – 10th Edition – Wiley Publications
2. A Text Book of Engineering Mathematics, B.V. Ramana - Tata McGraw Hill Publications
3. Advanced Engineering Mathematics – RK Jain & SRK Iyengar – Revised edition – Taylor & Fransis - 2002
4. E.Rukmangadachari & E. Keshava Reddy ,Engineering Mathematics , Volume-I, 2nd Edition-Pearson publishers.

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B.Tech-I Semester:	**L**	**T**	**P**	**[C]**
	3	**1**	**0**	**[3]**

(16HS1104) APPLIED CHEMISTRY

Course objectives:

1. To create a stronger foundation in the understanding of fundamental chemistry with an applied perspective for future engineers with a focus on engineering & industry.
2. To enable the student to know the important characteristics of water and its utility in industry.
3. To gain the flavor of electrochemical cells for thorough understanding and appreciation of the advancements in science with future needs to society.
4. Introducing new techniques and latest information that motivates the students to bring out his or her views and work effectively.
5. To enable the students understand the role of engineering materials such as polymers, cements, refractories, lubricants.

OUT COMES:

1. To apply the knowledge of working principle of batteries in engineering areas.
2. To apply the corrosion technology methods in various fields
3. To implement various water purification methods in industries.
4. To describe the boiler troubles and estimations of hardness.
5. To know the application and manufacture of new polymers for industrial demand
6. To know the knowledge of advanced polymer for different application
7. To finding the lubricants for engineering applications
8. To understand the processing of cementing in construction engineering.

Unit –I:

ELECTROCHEMISTRY AND CORROSION SCIENCE

Conductance, Equivalent conductance, Molecular conductance, application of conductance, Conductometric Titration –acid vs. base, Electrochemical cell and its applications.Numerical calculationconductivity and electrochemical cell.

Batteries: Ni-Cad cell, Lithium Cells, Fuel Cells, Hydrogen – Oxygen fuel cell, Methanol Fuel cell.

Corrosion-definition, examples, effects- Mechanism of Dry corrosion and wet corrosion. Factor Influencing corrosion, corrosion control methods-sacrificial anode, impressed current, inhibitors, Electroplating(Ni&Cr) and Electro less plating (Cu and Ni).

Unit –II

WATER TECHNOLOGY-I: sources and impurities of water, water treatment for drinking purpose-disinfection and concept of break –point chlorination –Desalination of brakish water-Principle and process of electro-dialysis and reverse osmosis.

WATER TECHNOLOGY-II: Boiler troubles –Scales, sludges, caustic embrittlement and boiler corrosion-causes, disadvantages and prevention, internal conditioning methods-phosphate, calgon and sodium aluminate-External treatment methods- ion-exchange methods. Estimation of Hardness, Dissolved oxygen, Alkalinity and chlorides.

Unit-III:

POLYMER TECHNOLOGY: polymerization-addition, condensation. Thermoplastics and thermosetting, preparation properties and application of Bakelite, Nylon, Teflon. Synthetic rubber, Buna S, Buna N, Poly-urethane, Thiokol rubbers. Conducting polymers-examples classification intrinsically conducting polymers and extrinsically conducting polymer, doping conducting polymers. Liquid Crystals-definition, properties and classification application. Natural rubber, Vulcanization, compounding of rubber. Inorgaic polymer-Silicones.

Unit-IV:

ENGINEERING MATERIALS AND FUEL TECHNOLOGY

Cement-types-Portland cement-composition, setting and hardening of Portland cement.

Lubricants: classification with examples, properties of lubricants –viscosity, flash point, fire point, cloud point, pour point.

Fuel Technology: Introduction, classification, solid fuel-Otto-Hoffmann's process, liquid fuel-Fischer-Tropsch Process. Calorific value, units of calorific value, Determination of calorific value of solid fuel by Bomb calorimeter. Numerical calculation for calculating of calorific values.

Text Books

1. Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Company, New Delhi.
2. A text book of Engineering Chemistry by S.S.Dara, S. Chand and Company Limited, New Delhi.
3. Engineering Chemistry by K.N. Jayaveera,G.V.Subba Reddy, C. Ramachandraiah, McGraw Hill(Pvt), New Delhi.

Reference Books

1. A text book of Engineering Chemistry by Shashi Chawla, DhanpatRai &Co (Pvt) Ltd, New Delhi.
2. Text book of Engineering Chemistry, C.Parameswara Murthy, C.V. Agarwal, Andra Naidu, B.S. Publications, Hyderabad.

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B.Tech- I Semester:	L	T	P	[C]
	3	1	0	[3]

(16CS1101) Computer Programming

Course Outcomes:

1. Ability to design algorithmic solution to problems.
2. Acquire knowledge about the basic concept of writing a program.
3. Understand the role of constants, variables, identifiers, operators, and type conversions of C Language.
4. Ability to design programs Decision making and utilizing repetition.
5. Ability to design modular programs using functions.
6. Concept of Array and pointers dealing with memory management.
7. Structures and unions through which derived data types can be formed.

UNIT – I:
Introduction to Computers and Programming:
Definition, Block diagram along with computer components, Characteristics & classification of computers, Types of programming languages.

Problem solving: top-down design, implementation of algorithms, Flow charts.
Introduction to C Language – History of C, features of C , General form of a C Program, character set in C,C-Tokens, Data types, Expression Evaluation, Operators and Expressions, Type Conversions, Formatted Input and Output.

UNIT – II:
Control Statements and Functions:
Decision Statements: If, if-else, nested if and switch Statements, Loop Control Statements - while, for, do-while Statements, Nested Loops, and Other Related Statements - break, continue, go to.

Functions: Function prototype, definition and accessing, passing arguments to a function, Library Functions, Scope of a function, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type qualifiers, Recursion - Recursive functions, C Preprocessor, header files.

UNIT – III:
Arrays, Pointers and Strings:
Arrays: introduction, 1-Dimensional, 2-dimensional array, Declaration, Initialization and Accessing, Multidimensional Arrays.

Pointers: Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations with Pointers, Pointers and Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Pointer to Functions, Command- Line Arguments.
Strings: String Basics, String Handling Functions.

UNIT – IV:
Structure and Union:
Structure and Union: Introduction, Features of structure, Declaration and Initialization of Structure, Structure within Structure, Array of Structures, Pointer to Structure, self referential Structures, Structures and Functions, type def and Enumerated data types, Unions, Bit fields.

Files: Introduction, Streams and file types, file operations.

Text Books:

1. Byron S Gottfried, Jitender Kumar Chabra, Programming with C, , Third Edition, McGraHill Pvt. Ltd.
2. Jeri R Hanly, Elliot B. Koffman, Ashok Kamthane, A. Ananda Rao, Programming in C and data structures, Pearson Education

Reference Books:

1. R. G. Dromey, How to Solve it by Computer, Person Education,2008.
2. B.A.Forouzan and R.F. Gilberg, C Programming & Data Structures, Third Edition, Cengage Learning,2000.
3. Stephen G. Kochan,Programming in C –III Edition, Pearson Educataion,2004.
4. J.A. Jones & K. Harrow ,C Programming with problem solving, Dreamtech Press
5. Harry H. Cheng,C for engineers and scientists an interpretive approach, , McGraHill International Pvt. Ltd E.Balagurusamy, C Programming & Data Structures, TMH,2009

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B.Tech - I Semester:	L	T	P	[C]
	3	0	0	[3]

(16ME1101) ENGINEERING MECHANICS

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

1. Develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.
2. Apply knowledge of trigonometry, calculus, and algebra to obtain solutions of elementary problems in engineering mechanics.
3. Analyze select multi-body systems by drawing free-body diagrams, calculate kinematic characteristics, and derive Conditions of static/dynamic equilibrium.
4. Provide preliminary information useful in design of components in a multi-body system under constraints.

Pre- requisite Courses:

Code	Course	L	T	P	C
16HS1103	Applied Physics	3	1	0	3

UNIT – I:
Basics of Engineering Mechanics: Basic Concepts of Engineering Mechanics: Characteristics of a force – various types of force systems – Resultant – Composition and resolution of forces –Principles of moments of force – Couples.

Resultants of Force System: Resultants of different types of force systems.

Equilibrium of Forces: Free body diagrams – Equations of equilibrium for different force systems

UNIT – II:
Frictional Resistance & Applications of Friction:
Frictional Resistance: Classification of friction- laws of friction –coefficient of friction-angle of friction – angle of repose – cone of friction – free body diagram-advantages-equilibrium of a body on a rough horizontal and inclined plane

Applications of Friction: Ladder friction – rope friction – wedge friction. Simple machines-concept of lifting machines-law of lifting machine.

UNIT – III:
Centroids and Centers of Gravity & Moments of Inertia:

Centroid and Centers of Gravity: Definition – Centroid and centers of gravity simple and composite bodies – Theorems of Pappus.

Moments of Inertia: Definition – Parallel axis theorem for areas – Second moments of areas by integration – Radius of gyration of areas – Moments of inertia of composite areas – Parallel axis and parallel plane theorems for masses – Moments of inertia of masses by integration – Radius of gyration of mass – Moments of inertia of composite masses(Simple Problems only).

UNIT – IV:
Kinematics: Introduction, Rectilinear kinematics: Continuous motion, General curvilinear motion, Curvilinear motion: Rectangular components, Motion of a projectile, curvilinear motion: Normal and tangential components, Absolute dependent motion analysis of two particles.

Kinetics: Newton's law of motion, The equation of motion, Equation of motion for a system of particles, Equation of motion: Rectangular coordinates, Equation of motion: Normal and tangential Coordinates.

Text Books:
      1. B. Bhattacharya, Engineering Mechanics- Oxford University Publications, 2009
      2. S.S. Bhavikatti, Engineering Mechanics, New Age Internationals, 2nd edition, 2010

References Books:
1. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.
2. Ferdinand.L.Singer, Engineering Mechanics (Statics and Dynamics), Harper Row Publishers.2007.
3. Shames.I.H, Engineering Mechanics (Statics and Dynamics), Prentice – Hall of India- New Delhi, 2004.
4. Timoshenko.S.P and Young.D.H, Engineering Mechanics, McGraw Hill Book Co. Ltd.2003.
5. S.Temoshenko,D.H.Young and J.V.Rao,Engineering Mechanics,Revised 4th Edition,Tata-McGraw-Hill Publishing Company Limited,New Delhi,2007.

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B.Tech - I Semester:	**L**	**T**	**P**	**[C]**
	0	**0**	**3**	**[2]**

(16CS2102) Computer Programming Lab

1. **Exercise-1**

   Programs on Expressions.

2. **Exercise-2**

   Programs on decision control statements.

3. **Exercise -3**

   Programs on loop statements.

4. **Exercise -4**

   Programs to implement on functions.

5. **Exercise -5**

   Programs to implement on parameter passing techniques.

6. **Exercise -6**

   Programs using recursion.

7. **Exercise-7**

8. Programs using arrays.

9. **Exercise -8**

   Programs to implement string handling functions.

10. **Exercise -9**

    Programs to implement on pointers.

11. **Exercise -10**

    Programs to implement on structures.

12. **Exercise -11**

    Programs on files.

13. **Exercise -12**

    Programs on command line arguments.

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B.Tech - I Semester:	**L**	**T**	**P**	**[C]**
	0	**0**	**3**	**[2]**

(16HS1108) APPLIED CHEMISTRY LAB

Outcomes:

1. To handle different glassware and apparatus and learn the skill in executing volumetric type experimental procedure.

2. To prepare some simple polymers.

3. To know the characteristics of lubricants and be able to modify lubricants according to purpose.

4. To take care of pollution control measures in industry.

5. To learn the desirable limits of various constituents in water analysis and its importance.

Applied chemistry Lab

1. Estimation of dissolved oxygen in water samples

2. Preparation of standard EDTA solution and estimation of hardness of water

3. Corrosion of mild steel in acid and influence of an inhibiter thio urea.

4. Preparation of standard potassium dichromate solution and estimation of ferrous ion

5. Determination of calorific value of solid fuel by using Bomb Calorimeter.

6. Determination of strength of given strong acid and strong base solution by conductometric titrations.

7. Estimation of chloride ion in water sample by Mohr's method.

8. Determination of viscosity of the oil through redwood viscometer.

9. Determination of alkalinity of water.

10. Preparation of Phenol-Formaldehyde Resin (Bakelite)

Text Books

1. Quantitative Analysis by A.I. Vogel.

2. Engineering Chemistry Lab Manual by K.Gouru Naidu.

3. Laboratory Manual on Engineering Chemistry, S.K.Bhasin and Sudha Rani, 2nd Edition,

   Dhanpat Rai Publishing Company, New Delhi.

Reference Books

1. Text Book of Engineering Chemistry by R.N. Goyal and Harrmendra Goel.

2. A text book on experiments and calculations-Engineering Chemistry. S.S. Dara.

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	L	T	P	[C]
B.Tech - I Semester:	0	0	3	[2]

(16ME2104) ENGINEERING WORKSHOP AND IT WORKSHOP LAB

COURSE OUTCOME:

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

1. Utilize workshop tools for engineering practice.

2. Analyze and find out suitable method of fabrication of a given simple component.

3. Employ skills acquired to provide quick fixes for routine domestic and/or industrial problems.

4. Appreciate the hard work and intuitive knowledge of the manual workers.

1: Trades for Exercises:

(a) Carpentry Shop

1. Cross Lap Joint

2. Mortise and Tenon Joint

(b) Fitting Shop

1. Square Fitting

2. V Fitting

(c) Sheet Metal Shop

1.3-Sided Tray (Trapezoidal Tray)

2. Cylinder (Circular Tin)

(d) House Wiring

1. Wiring for two lamps (bulbs) with independent switch controls with or without looping

2. Wiring for stair case lamp.

(e) Foundry

1. Single Piece Pattern

2. Double Piece Pattern.

(f) Welding

1. Lap Joint

2. T – Joint

2: Trades for Demonstration

i. Machine Shop (Lathe Machine, Grinding Machine and Drilling Machine)

ii. Metal Cutting

iii. Plumbing

In addition to the above, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, plastics, steels, meters, gauges, equipment, first-aid and shop safety shall be demonstrated through charts, layouts, figures, circuits, CD or DVD.

Reference Books:

1. Engineering Work shop practice, V. Ramesh Babu, VRB Publishers Private Limited, 2009

2. Work shop Manual, P.Kannaiah and K.L.Narayana, SciTech Publishers, 2009

3. Workshop Practice Manual, K. Venkata Reddy, BS Publications,

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B.Tech - II Semester:	**L**	**T**	**P**	**[C]**
	3	**0**	**0**	**[3]**

(16HS1201) PROFESSIONAL ENGLISH - II

Objectives:

1. To impart basic skills of communication in English through intensive practice.
2. To make students to think in imaginative and creative manners.
3. To enable students to express themselves in different contexts- formal and informal.
4. To explore the richness and diversity of language, how it can affect the students in different contexts.

Outcomes:

After the completion of the course, the students would have:

1. Use English language skills at basic level.
2. Recognize the personal enrichment to be gained from a love of English, literature and learning.
3. Acquired ability to interact politely and cooperate with others.
4. Identify and compare different kinds of Resume styles.
5. Design and develop functional skills in Professional contexts.

UNIT-I

Text: The Eyes are Not Here by **Ruskin Bond**

Communication: Short oral presentation, Group Discussion- definition, types, structure, practice, Dynamics of group, clarity in thought and expression, Dos and Don'ts of GD

UNIT-II
Text: The Open Window by **Sak**

Communication: Resume Writing, format of Cover Letter.

UNIT-III
Text: The Romance of a Busy Broker by **O Henry**

Communication: Interview Skills, Types of Interviews, Pre Interview Techniques, Types of Questions and Answering Strategies

UNIT-IV

Exercises on Common Errors in English, If- Clauses', One Word Substitutions, Idioms and Phrases, Words often Confused, Pre-fixes and Suffixes.
Text: Vibrant English 2014 Orient Black Swan

References:
1. Meenakshi Raman and Sangeetha Sharma, **Technical Communication**, Oxford University Press, New Delhi, 2012.
2. 1. M. Ashraf Rizvi, **Effective Technical Communication**, Tata McGraw–Hill, Publishing Company Limited, First Edition, 2005.
3. *Practical English Usage* by Michael Swan, 3rd Edition, OUP.
4. *Intermediate English Grammar* by Raymond Murphy, CUP.
5. *Study: Reading by* Eric H .Glendinning, 2nd Edition CUP.
6. *Business Correspondence and Report writing* by R.C Sharma, Tata McGrawhill.

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B.Tech - II Semester:	**L**	**T**	**P**	**[C]**
	3	**1**	**0**	**[3]**

(16HS1202) INTEGRAL TRANSFORMS

Objectives:

To enable the students to learn

1. The knowledge of Laplace transforms to solve Differential equations with initial conditions
2. Expand various functions Fourier series
3. About Fourier Transforms of different functions
4. The knowledge of Z - transforms to solve Difference equations

Outcomes:

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

1. Gain the concepts of Laplace and inverse Laplace transforms
2. Solve the ordinary differential equations with initial conditions using Laplace transforms
3. Expand various algebraic, trigonometric and hyperbolic functions in Fourier series in different intervals
4. Solve the various boundary value problems using Fourier transforms
5. Obtain the knowledge of Z and inverse Z - transforms
6. Compute the solutions of difference equations using Z - transforms

UNIT I Laplace Transforms (LTs)

Laplace transforms of elementary functions – Properties - Transforms of derivatives, integrals –Unit step function-Dirac delta function- Periodic function

Inverse Laplace transforms by Partial fractions – Properties - Convolution theorem – Application of Laplace transforms to ordinary differential equations of first and second order

UNIT II Fourier series (FS)

Euler formulae (without proof) – Expansion of functions as a Fourier series –Change of Interval – Even and odd functions – Half range series – Complex form of Fourier series

UNIT III   Fourier Transformations (FTs)

Fourier Integral theorem (without proof) – Fourier transformations – Properties - Sine and Cosine transformations - Inverse Fourier transformations – Convolution – Parseval's Identity

UNIT IV Z - Transformations (ZTs)

Z – transforms of elementary functions – Properties – Shifting theorems – Initial and Final value theorems - Inverse Z – transforms by convolution and partial fractions – Applications to first and second order difference equations

TEXT BOOKS:

1. Higher Engineering Mathematics – 42nd Edition - Dr. B.S. Grewal - Khanna publications

   REFERENCE(S)

   1. Advanced Engineering Mathematics – E. Kreyzig – 10th Edition – Wiley Publications
   2. A Text Book of Engineering Mathematics – I - T.K.V. Iyengar, B. Krishna Gandhi and Others - S. Chand & Company – Revised edition 2013
   3. A Text Book of Engineering Mathematics – II - T.K.V. Iyengar, B. Krishna Gandhi and Others - S. Chand & Company – Revised edition 2013
   4. E.Rukmangadachari & E. Keshava Reddy ,Engineering Mathematics , Volume-I&II, 2nd Edition-Pearson publishers.
   5. Advanced Engineering Mathematics – RK Jain & SRK Iyengar – Revised edition – Taylor & Fransis - 2002

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B.Tech - II Semester:	**L**	**T**	**P**	**[C]**
	3	**1**	**0**	**[3]**

(16HS1103) APPLIED PHYSICS

Objective(s): The Impart the awareness among the engineering students about the present day technologies in physics to reach the heights of technical globe with latest technologies in Fiber Optics, Nanotechnology, Superconductivity and Lasers.

Outcomes:

1. To understand the super position effects like Interference, Diffraction and Polarization and to list the types of optical fibers and using optical fibers in modern communication system and medical field
2. To interpret the different crystal systems, crystal structure determination by X-rays
3. To summarize the concepts of LASERS, different types of LASERS and its applications
4. To Study Quantum Mechanics and how Quantum Mechanics is carried out in the fields like medicine and industry
5. To understand the concepts of Superconductivity and to understand properties of Magnetic and Dielectric Materials and its applications
6. To analyze various types of Nanomaterials, significance of low dimensional materials, useful applications of Nanotechnology in various field like medicine, biological, chemical, industrial and many important areas in science and technology

Unit-I

OPTICS

Interference: Introduction – Interference in thin film by reflection –Newton's rings

Diffraction: Introduction - Fraunhoffer diffraction due to single slit, Diffraction grating.

Polarization: Types of polarization-Nicol's prism-production and detection of different polarizations.

Unit-II
FIBER OPTICS & LASERS

Fiber optics: Construction of optical fiber-Principle of optical fiber- Acceptance angle and acceptance cone - Numerical aperture- Types of optical fibers – Optical fiber communication system and its advantages - Applications of optical fibers

Lasers*:* Introduction-Characteristics of laser – Spontaneous and stimulated emission of radiation – Population inversion - pumping methods -Ruby laser- He-Ne laser - Applications of lasers.

UNIT – III

PRINCIPLES OF QUANTUM MECHANICS AND SEMICONDUCTORS

Principles of Quantum Mechanics*:* Waves and particles – de-Broglie hypothesis- Matter waves-Heisenberg uncertainty principle - Schrodinger's time independent wave equation – Physical significance of wave function - Particle in one dimensional infinite potential box.

Semiconductors: Introduction-Fermi level in Intrinsic and Extrinsic semiconductors-law of mass action – Drift & diffusion currents - Einstein's equation – Hall Effect.

UNIT – IV

CRYSTALLOGRAPHY, SUPERCONDUCTORS AND NANO MATERIALS

Crystallography and X-Ray Diffraction: Introduction – Space lattice-Basis –Unit cell – Lattice parameters –Bravais lattices – Crystal systems- Expression for lattice constant–Packing fractions of SC, BCC and FCC – Miller indices – Expression for Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law

Superconductors*:* Introduction - properties of super conductors - Meissner effect – Type I and Type II superconductors – BCS theory- Applications of superconductors.

Magnetic Materials: Basic Definitions-classification of magnetic materials-hysteresis-soft and hard magnetic materials.

Dielectric Materials: Basic Definitions-Internal Field-Clausius-Mossitti Equation-Dielectric Loss-Applications.

Nano materials: Basic principles of nanomaterials – properties of nanomaterials: Physical, optical, thermal, mechanical and magnetic properties–Applications of nanomaterials.

TEXT BOOKS

1.K.Thyagarajan, Engineering Physics, I Edition 2013, Tata Macgraw Hill
2. P.K.Palanisamy , Engineering Physics, II Edition 2010 Scitech Publishers
Reference Books:
1. A.J. Dekkar , Solid State Physics , Latest edition, 2012. McMillan Publishers
2. M. Arumugam , Engineering Physics II Edition, 1997 , Anuradha Publications.
3. S. ManiNaidu ,Engineering Physics, I Edition, 2012. Pearson Education
4. Gaur and Gupta Dhanapati , Engineering Physics, 7th Edition, 1992 Rai Publishers ,.
5. B S Murthy, P.Shankar, Baldev Raj B BRath, James Murday , I Edition, 2012.
Text book of Nanoscience and Nanotechnology:, University Press,
6.Solid State Physics-S.O.Pillai
7. Nanotechnology Principles and Practices-Sulabh k. Kulkarni

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B.Tech - II Semester:	L	T	P	[C]
	3	0	0	[3]

(16HS1103) ENVIRONMENTAL STUDIES

OBJECTIVES:

The course enables the students to:

1. Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
2. Prepare with a perspective of "Think Globally Act Locally".
3. Appreciate in respecting all forms of life and all life supporting systems.
4. Learn the management of environmental hazards.
5. Understanding importance of environmental studies and follow sustainable development practices.

OUTCOMES:

1. Apply their knowledge in biology, chemistry, physics, earth science and economics for better understanding of earth's environment.
2. Understanding the importance of natural resources.
3. Comprehend the environmental problems from multiple perspectives with emphasis on human modern lifestyle and developmental activities.
4. Recognize the inter connectedness of human dependence on the earth's ecosystems.
5. Understanding the value of biodiversity and the conservation of biodiversity.
6. Influence his society in proper utilization of goods and services.
7. Able to apply waste water treatment
8. Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century.

UNIT-1:

Introduction to Environmental Studies & Natural Resources

Environment: Definition, scope, need for public awareness

Natural Resources: Renewable & Non renewable resources Forest Resources: Use, Deforestation-Case Studies;

Water Resources: Use, Over-exploitation of surface and ground water, Environmental impacts of Dams, Floods and Droughts;

Food Resources: Changes caused by agriculture, over grazing; Effects of modern agriculture- fertilizer, pesticide problems, water - logging and salinity;

Energy Resources: Renewable & non renewable energy resources, Use of alternate energy sources

UNIT-2:

Ecosystems & Biodiversity

Ecosystems: Definition, Structure of an ecosystem Functions of ecosystem- Food chains, Food web, Energy flow, Ecological pyramids   Types of Ecosystems: Forest Ecosystem, Aquatic Ecosystem

Biodiversity: Definition, levels of biodiversity, Value of biodiversity, Hotspots of biodiversity, India as mega biodiversity nation, Threats to biodiversity- Poaching, Habitat loss, Endangered & endemic species of India, Conservation of biodiversity: In-situ & Ex-situ conservation

UNIT-3

Environmental Pollution

Pollution: Definition, Causes & Control measures of Air pollution, Water pollution, Soil pollution, noise pollution, Solid waste management - Causes, effects and control measures Role of an individual in preventing pollution

UNIT-4

Social Issues & Environment

From unsustainable to sustainable development, water conservation, rain water harvesting, watershed management, environmental ethics & issues, possible solutions, ozone layer depletion, global warming, consumerism & waste products

Environment protection acts: Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act - Wild life Protection Act- Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

TEXT BOOKS

1. Text book of Environmental Studies for Undergraduate Courses by Erach.Bharucha for University Grants Commission, Universities Press
2. Environmental Studies by R. Rajagopalan, Oxford University Press
3. Environmental Studies by Benny Joseph, Mc. Graw Hill Publications

REFERENCE BOOKS

1. Kaushik A, Kaushik C.P, Perspectives in Environmental Studies, 3rd ed., New International Publishers
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication
3. Environmental Studies by Anindita Basak-Pearson education
4. Comprehensive Environmental Studies by J P Sharma, Laxmi Publications

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B.Tech - II Semester:	**L**	**T**	**P**	**[C]**
	3	**1**	**0**	**[3]**

(16EE1201) BASICS OF ELECTRICAL AND MECHANICAL ENGINEERING

(PART-A) ELECTRICAL TECHNOLOGY

Course Outcomes:

Upon completion of this course the students are able:

1. To identify the type of electrical machines for a given application.
2. To know the importance induced emf due to relative motion between conductor and magnetic field.
3. To know the constructional features of induction motor, dc machines and transformers.
4. To identify the type of welding for different applications.
5. To understand the importance of I.C Engines.
6. To analyze the principle and applications of different cooling systems.

UNIT-I:

DC Machines: Working principle of DC machine as a generator and motor. Types and constructional feature. E.M.F equation of generator, relation between induced E.M.F and terminal voltage taking into account both brush drop as well drop due to armature reaction. Back E.M.F and its importance, torque equation of D.C motor. Types of D.C. motors- Characteristics and applications. Necessity of a starter for motor. Numerical problems on E.M.F Equation, back E.M.F & Torque Equation only.

Transformers: Principle of operation and construction and types of single phase transformers. E.M.F equation, power losses, efficiency and voltage regulation-numerical problems.

UNIT-II:

Alternators: Principle of operation, types and constructional features. E.M.F equation of alternator, regulation by synchronous impedance method – principle of operation of induction motor slip – torque characteristics – applications.

Instruments: Basic principles of indicating instruments – permanent magnet moving coil and moving iron instruments.

(PART-B) MECHANICAL TECHNOLOGY

UNIT-III:

Welding processes: interdiction to welding classification of welding processes oxyacetylene welding - equipment , welding fluxes and filler rods gas cutting interdiction to arc welding – manual metal arc welding submerged arc welding TIG and MIG processes soldering and

brazing importance comparison and applications.

Description and working of steam engines and steam turbines (prime movers) impulse and reaction turbines description and working of I.C engines – 4 stroke and 2 stroke engines – comparison – gas turbines – closed and open type gas turbines.

UNIT –IV:

Reciprocating air composers – description and working of single stage and multistage reciprocating air compressors – inter cooling transmission of power belt rope chain and gear drive simple problems.

Block diagram of a vapour compression refrigeration system names of common refrigerants basic principles of air conditioning room and general air conditioning system ducting different types of ventilation system,Earth moving machinery and mechanical handling equipment bull dozers power showels excavators concrete mixer – belt and bucket conveyers.

Text Books:

1. T K Nagasarkar, and M.S. Sukhija, Basic Electrical Engineering, Oxford University Press 2nd
   Edition 2007.

2. M.S.Naidu and S. Kamakshiah, Basic Electrical Engineering. TMH.3 rd Edition 2009.

3.   Khurmi "Mechanical Technology".

Reference Books:

1. D P Kothari and I.J. Nagrath, Theory and solutions of Basic Electrical Engineering. PHI.2010

2. B.L Theraja & A.K.Theraja, "A Text Book of Electrical Technology", 3rd Revised Edition, S.Chand &

   Company Ltd., New Delhi, 2005.

3. J.B Gupta, "A Course in Electrical Technology", S K Kataria & Sons, 2003.

4. Kodandaraman C.P "Mechanical Technology"

5. Construction Planning; Equipment and Methods – Purify.

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(AUTONOMOUS)

B.Tech - II Semester:	L	T	P	[C]
	0	0	3	[2]

(16HS2106) PROFESSIONAL ENGLISH LABORATORY

Objectives:
1. To equip students with effective speaking and listening skills in English.
2. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
3. To sensitise the students to the nuances of English speech sounds,
4. To train students to use language appropriately for Just a Minute, Situational dialogues and public speaking

Outcomes:
After the completion of the course, the students would have
1. Gained practical knowledge in English Speech Sounds.
2. Developed ability on various language functions to fulfill the purpose of speaking and writing in academic and professional context.
3. Ability to communicate effectively in different formal and informal situations.
4. Demonstrate various language functions

UNIT- I

Phonetics: Vowels, Diphthongs and Consonants, Received Pronunciation,

Transcription

UNIT– II

Stress (Word Stress & Sentence Stress), Intonation, Listening to various accents.
Just A Minute (Prepared & Extempore) & Situational Dialogues

UNIT – III
Listening to Telephone Conversations and Telephone Etiquette

UNIT – IV
Effective Group Discussion, Strategies for developing G.D.content, Maintaining direction,effective conclusion, -- towards consensus- Audio and video lesions for exposure to and comprehension of spoken English

References:
1. Daniel Jones, English Pronouncing Dictionary, Current Edition with CD.
2. R. K. Bansal and J. B. Harrison, Spoken English, Orient Longman 2006 Edn.
3. Krishna Mohan & NP Singh, Speaking English Effectively, (Macmillan)
4. J. Sethi, Kamlesh Sadanand & D.V. Jindal, A Practical Course in English Pronunciation, (with two Audio cassettes), Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Dr Shalini Verma , Body Language- Your Success Mantra , S.Chand & Co, 2008
6. English Dictionary for Advanced Learners, (with CD) International edn. Macmillan 2009

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B.Tech - II Semester:	**L**	**T**	**P**	**[C]**
	0	**0**	**3**	**[2]**

(16HS1107) APPLIED PHYSICS LAB

Objectives:

The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies. To achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability to develop and fabricate engineering and technical equipment

Outcomes

1. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
2. Develop procedures and observational skills as data is taken and gain a fundamental understanding of simple and complex apparatus used in the experiment.
3. Apply physics concepts to the research and development of new or improved technologies.
4. Students will learn how to effectively work in a team environment when solving Engineering Physics related problems.
5. Obtain and analyze scientific data from laboratory or field instruments.

LIST OF EXPERIMENTS

1. Determination of radius of curvature of Plano convex lens- Newton's rings
2. Dispersive power of the prism-Spectrometer
3. Determination of wavelength of Spectral line of mercury spectrum using Diffraction grating -Normal Incidence
4. Determination of wave length of a laser source-Diffraction grating
5. Determination of particle size by using laser source
6. Numerical Aperture of an optical fiber
7. Magnetic field along the axis of a current carrying coil-Stewart and Gee's method
8. Determination of Energy gap of a material of a p-n junction
9. Determination of Rigidity modulus of a wire material-Torsional pendulum
10. Determination of thickness of a thin wire by using parallel fringes
11. Determination of frequency of an electrically vibrating tuning fork- Melde's method

12. Determination of Planck's Constant
13. Determination of Hall Coefficient of semi conductor

Manuals/Books

1. Manual cum Record for Engineering Physics Lab-1&2, by Prof. Sri M. Rama Rao, Acme Learning.
2. Physics lab Manual-Department of H&S, ASCET (Autonomous)

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B.Tech - II Semester:	L	T	P	[C]
	0	0	3	[2]

(16ME2103) ENGINEERING DRAWING PRACTICE

COURSE OUTCOME:
After completion of the course, a successful student will be able to:

1. Convey visual perception information regarding relative locations of objects through an orthographic/isometric view.

2. Analyze a drawing and bring out any inconsistencies to put forth inferences graphically.

3. Create feasible designs of simple objects with drawing tools and/or free-hand.

4. Get training in the transformation of the imagined data to present as drawings so that the communication skill will be increased especially in technical subjects.

5. Impart the training in multi-view representations and its conversion into pictorial views and the reverse also.

6. Ability to understand the different standards in technical drawing and to help in reaching future engineering positions especially in research and design.

7. Generate solids and isometric projections in Auto-CAD.

UNIT – I:
Introduction to Engineering Drawing: Geometrical Constructions-Construction of Polygons.
Conic Sections
Ellipse: Eccentricity method, Oblong method, Parallelogram method, Arc's of Circles method and Concentric Circles method.
Parabola: Eccentricity method, Rectangle method, Tangent method, Parallelogram method.
Hyperbola: Eccentricity method, Rectangular hyperbola, Asymptotes method, two branches of Hyperbola (Arc's of Circles method), Abscissa- Ordinate- method.
Cycloids: General Cycloid, Epi-Cycloid, Hypo-Cycloid.

UNIT – II:
Projections of Points, Straight Lines, Planes:
Points: Introduction to Orthographic Projections, Describing of quadrants, First and Third angle projection – Position of points in 4 quadrants.
Straight Lines: Lines parallel to both the principal planes, perpendicular to one plane and parallel to another plane, lines inclined to one plane, lines inclined to both the planes, finding true lengths, true inclinations.
Planes: Projection of regular plane surfaces, planes parallel to one plane, planes inclined to one plane and inclined to both the planes.

UNIT – III:
Projection of Solids, Sections and Development of Solids with Auto -CAD
Solids: Positions of regular solids(prism, cylinder, pyramid and cone) – Projection of Solids – Axis perpendicular to one plane and parallel to another plane, inclined to one plane and inclined to both the planes, Axis parallel to both the Principal planes.
Section of Solids: Section Planes and Sectional views of Right Regular Solids–Prism, Cylinder, Pyramid and Cone. True shapes of the sections.
Development of Solids: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectional parts.

UNIT – IV:
ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS WITH AUTO-CAD
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.
Orthographic Projections – Conversion of pictorial views into orthographic views

Text Books:
    1. N.D. Bhat, Engineering Drawing, Charotar Publishers, 52nd Revised and Enlarged: 2013
    2. K.L. Narayana, P. Khanniah, Engineering Drawing, Publisher, Scitech

Reference books:
    1. Venugopal, K., A Textbook of Engineering Graphics , New age Publishers,2009
    2. Venkata Reddy, Engineering Drawing, B.S.Publishers ,2009
    3. Basant Agrawal, C M Agrawal ,Engineering Drawing, 2013
    3. V.Ramesh Babu, Engineering Drawing .2009

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B.Tech - III Semester:	L	T	P	[C]
	3	1	0	[3]

(16HS1302) PROBABILITY & STATISTICS

Objectives:

To enable the students to learn

1. probability distributions
2. testing of hypothesis based on probability distributions
3. large and small sample tests
4. Analysis of Variance

Outcomes:

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

1. Gain the concepts of probability distributions
2. Apply the knowledge of normal and sampling distribution to various practical situations using normal tables
3. Test the hypothesis of various engineering problems
4. Investigate the small samples using χ^2-and t – tests
5. Get the concept of F – test
6. Analyze various industrial applications using Analysis of variance

UNIT – I: Distributions

Binomial, Poisson and normal distributions – Properties of normal distribution – Areas under normal curve – Population and Sample - Sampling distributions of means (with and without replacement)

Unit – II – Test of Hypothesis and Large Sample Tests

Statistical Hypothesis – Tests of Significance - Null and Alternative hypotheses –Types of errors - Level of Significance – Critical values and region – One and two tailed tests – Procedure for hypothesis testing - Testing of significance of means and proportions

Unit – III – Small samples tests

Degrees of freedom - Chi – square test - χ^2 - test for goodness of fit - 2×2 contingency table - Student's t – distribution – testing of single mean and difference of means

Unit – IV   F – test and ANOVA

F – test - AN0VA - One and Two – way classifications

TEXT BOOKS :

1. Fundamentals of Statistics – S. C. Gupta – Himalaya Publications (6th revised and enlarged edition)
2. Probability and statistics by Dr. T.K.V. Iyengar - S Chand & Co- Revised edition

REFERENCES:

1. Miller's and Freund's "Probability and Statistics for Engineers" – Johnson Richard A – 2011 Edition – Prentice Hall of India
2. Advanced Engineering Mathematics - Erwin Kreyzig – John Wiley & sons Inc. - 10th edition
3. Higher Engineering Mathematics - Dr. B.S. Grewal - Khanna Publication.(42nd edition)
4. Probability & Statistics – E. Rukmangadachari & E. Keshava Reddy – Pearson Education – Revised edition

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(AUTONOMOUS)

B.Tech - III Semester:	L	T	P	[C]
	3	0	0	[3]

(16CE1301) Building Materials, Planning and Construction

Course Outcome:

1. To achieve command and Knowledge Towards civil engineering materials used in construction
2. To procure Knowledge on brick and stone masonry in building construction
3. To procure knowledge on lime, cement, wood and their importance in construction field
4. To understand the construction practices and techniques
5. To procure knowledge on building components and various finishing's in building construction
6. To prepare the building plans satisfying the principles of planning and bye laws

Pre- requisite Courses: NONE

UNIT – I:

Structural Clay products: Bricks-classification; characteristics of good brick; Ingredients of good brick earth – functions of various ingredients; Harmful ingredients in brick earth; Manufacturing of bricks - clamp burning and kiln (only Hoffman's kiln) burning; defects in bricks; tests for bricks; Tiles- Characteristics of good tile; Types of tiles.

Stones: properties of building stones – relation to their structural requirements; classification of stones; quarrying of stones– precautions in blasting; dressing of stone; Characteristics of Good Building Stone.

Timber: structure of timber; characteristics of timber; seasoning of timber; Defects in timber; Decay of timber; Preservation of timber; fire resistance of timber; properties of wood; classification of timber.

UNIT – II:

Other Materials: Ferrous Metals: Structures of Ferrous Metal; iron, Pig iron, Cast Iron, Wrought Iron, Steel- composition, properties and uses; rolled steel section; reinforcing steel bars; rusting and corrosion; tensile testing of steel. Non Ferrous Metals: Aluminum, Copper- composition, properties and uses. Glass: constituents, commercial forms, glass wool. Paints: composition; covering power of paints; painting plastered surfaces, wood surfaces, metal surfaces; enamel; distemper; varnish.

Stone & Brick Masonry: Masonry-terms used in masonry; classification of stone masonry; supervision of stone masonry construction. Brick masonry- terminology; bonds in brick work; bond at connections; supervision of brick work; defects in brick masonry; thickness of a brick wall; comparison of brick and stone masonry.

UNIT – III:

Building components-I: Walls: Types of walls; load bearing wall; partition walls-brick partitions, concrete partitions, glass partitions, timber partitions. Floors: components of floor; selection of flooring material; cement concrete flooring; terrazzo, mosaic, marble and tiled flooring. Roofs: requirements of a roof; types of roofs; pitched roofs-basic elements; types of pitched roofs; king post truss; queen post truss.

Building components-II: Lintels and Arches: lintels-classifications; RCC lintels; Arch-terms used; classification of arches. Stairs: Technical terms; requirements of good stair; dimensions of a step; classification of stairs. Doors and windows: location of doors and windows; technical terms; size of doors; door frames; types of doors; windows-types.

Finishing's: plastering: Terminology used in plastering work; types of plaster finishes; defects in plastering. Pointing-methods. Damp proofing: causes of dampness; methods of damp proofing; materials used in damp proofing; D.P.C. treatment in buildings; Termite proofing; introduction; anti termite treatment-site preparation, soil treatment. Shoring, underpinning and scaffolding.

UNIT – IV:

Planning of Buildings: Types of buildings, types of residential buildings, site selection for residential building, 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 bye-laws.

Project Networking: Project management; Methods of planning and programming; Bar chart;
Elements of network planning; PERT and CPM Networks; computation of times and floats – their significance.

Text Books:
    1. S K Duggal, Building material, New Age International Publishers; Second Edition,
    2. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain ,Building Construction - Laxmi
Publications (P) ltd., New Delhi, 10th edition,2009.
    3. Yashwant S. Sane, Planning and Designing Buildings ,Allies Book Stall.1964

Reference Books:
    1. Dr N. Kumaraswamy ,A.Koteswara Rao Building Planning & Drawing –Chorotar

publishing house, 7th Edition: 2013

2. S. C. Rangwala; Engineering Materials ,Charotar Publishing House, 40th Revised and Enlarged : 2013

3. P.C. Varghese, Building Construction, Prentice-Hall of India private Ltd, New Delhi,2013

4 P.C. Varghese, . Building materials , Prentice-Hall of India private Ltd, New Delhi,2012

5. Civil Engg. Materials by Technical Teachers' Training Institute, Chandigarh, Tata-Mc Graw- Hill Publishing Company Ltd., New Delhi.

6. Materials of construction by R.C. Smith, McGraw-Hill Company, New York

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR

(AUTONOMOUS)

B.Tech - III Semester:	L	T	P	[C]
	3	1	0	[3]

(16CE1302) STRENGTH OF MATERIALS-I

Course Outcome:
1. Apply the fundamental concepts of stress and strain in the design of various structural components
2. Determine the stresses on inclined planes and find the location of principal planes
3. Analyze determinate beams to determine shear forces, bending moments
4. Determine the flexural stresses induced and the variation of these stresses across different cross sections
5. Determine the shear stresses and their variation over different cross sections
6. Calculate the deflection and slope produced in a beam subjected to system of loads by different methods

Pre- requisite Courses:

Code	Course	L	T	P	C
16ME1101	Engineering Mechanics	3	1	0	3

UNIT-I:
Simple Stresses and Strains: Types of stresses and strains, Hooke's law, stress-strain diagram for mild steel, Working stress, allowable stress and factor of safety, St. Venant's Principle Elastic constants and relation between them, Poisson's ratio, volumetric strains, Analysis of Bars of varying section, composite bars, Temperature / Thermal stresses, Elongation of a bar due to its own weight.

Principal Stresses and Strains: Principal stresses and principal planes, Methods of determining stresses on oblique section , Analytical method, Graphical method (Mohr's circle of stresses

UNIT- II:
Shear Force and Bending Moment Diagrams: Definition of beam, Types of beams, Types of loads, Shear force (S.F) and Bending moment (B.M), S.F and B.M diagrams for cantilever, simply supported and over hanging beams subjected to point loads, uniformly distributed load (U.D.L), uniformly varying loads (U.V.L) and combination of these loads, Point of contra flexure, Relation between load, shear force, and bending moment.

UNIT- III:
Flexural Stresses: Flexural stresses, Theory of simple bending, assumptions, Derivation of bending equation, Neutral axis and Moment of Resistance, Bending stresses in symmetrical sections, Section modulus for various shapes or beam sections (rectangular, circular, solid and hollow, I, T, angle and channel sections) .

Shear Stresses: Introduction, Shear stress at a section (derivation of equation), Shear stress distribution for different sections (rectangular, circular, solid and hollow, I, T, angle sections.

UNIT- IV:

Deflection of Beam 1: Introduction, Relation between curvature, Slope & Deflection, Deflection curves, Differential equation for the elastic line of a beam - Double integration and Macaulay's methods.

Deflection of Beam 2: Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.DF.L. Uniformly varying load –Moment area method: Slope and deflection for Cantilever, simply supported & over hanging beam – Deflections of propped cantilevers for simple loading cases

Text Books:
1. R. K. Bansal, Strength of materials ,Lakshmi Publications, 5th Edition, 2012.
2. R. K. Rajput, Strength of Materials ,S. Chand and Co., New delhi.1999
3. S. S. Bhavikatti, Strength of Materials I & II ,New Age Publications,20123.
4. Popov E P, "Engineering Mechanics of Solids", SI Version, Prentice Hall, New Delhi.

Reference books:
1. Strength of Materials and mechanics of solids Vol-1 & 2 by B.C. Punmia, Laxmi Publications, New Delhi,2013
2. Theory of structures by Ramamuratam,jain book depot , New Delhi
3. James M. Gere, Stephen Timoshenko, Mechanics of materials, CBS Publisher ,2004.
4. Timoshenko S P and Young D H, "Elements of Strength of Materials", East West Press,New Delhi.
5. Shames, I. H., Pitaresi, J. M., "Introduction to Solid Mechanics," Prentice-Hall, NJ.

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(AUTONOMOUS)

B.Tech - III Semester:	L	T	P	[C]
	3	1	0	[3]

(16CE1303) FLUID MECHANICS

Course Outcome:
At the end of the course the learners will be able to
1. Understand the concepts of fluid properties like specific gravity, viscosity, density, surface tension.
2. Determine the pressure head of a fluid in a pipe by using manometer.
3. Calculate the forces acting on submerged bodies
4. Analyze the met centre and met centric height on floating bodies
5. Applying the flow measurement concept in pipes, notches and weirs
6. Understand the friction losses while flowing through a pipe
7. This study is used for the estimation of shear stress and velocity gradient for the design of submersed bodies.

Pre- requisite Courses: NONE

UNIT – I:
Fluid Properties: Dimensions and units – physical properties of fluids-Types of fluids
Pressure and its Measurement: Fluid Pressure at a Point; Pressure variation with temperature, density and attitude**.** Pascal's law; Hydrostatic law; Atmospheric, Absolute and gauge pressure; Pressure measurement- manometers: Simple, differential and Micro Manometers.

Hydrostatic Forces on Surfaces: Total Pressure and Centre of Pressure: on Horizontal Plane Surface;
Vertical Plane Surface; Inclined Plane Surface and Curved
Surfaces.

UNIT-II:
Buoyancy: Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacentre and Metacentric height, analytical method for Metacentric height.

Kinematics of Fluid Motion: Methods of describing fluid motion; Classification of flows; Streamline; Path line; Streak line; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flow net; Vortex flow – free vortex and forced vertex flow.

Dynamics of Fluid Flow: Forces acting on a Fluid in Motion; Euler's equation of motion; .Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend.

UNIT-III:
Flow Measurements in Pipes: Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube, Pitot - static tube.

Flow through Orifices and Mouthpieces: Flow through Orifices: Classification of Orifices; Determination of coefficients for an Orifice Flow through large rectangular Orifice; Flow through submerged Orifice – fully sub-merged and partially sub-merged. Classification of Mouthpieces; Flow through external and internal cylindrical Mouthpiece, time taken for emptying a tank.

Flow Over Notches & Weirs: Classification of Notches and Weirs; Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Cipolletti weir, Broad crested weir.

UNIT-IV:
Analysis of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Pipes in series, parallel & branched pipes.

Laminar Flow: Reynolds's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe (Hazen poiseuille equation)

Turbulent Flow in Pipes: Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow, Variation of friction factor with Reynolds number- Moody's chart.

Text Books:
    1. P. N. Modi & S. N. Seth; Hydraulics & Fluid Mechanics , Standard Book house, New
Delhi,17th edition 2011
    2. Dr. R. K. Bansal; Fluid Mechanics & Hydraulic Machines ,Laxmi Publications, New Delhi.9th
edition,2010

Reference Books:
    1. A. K. Jain; Fluid Mechanics , Khanna Publishers, Delhi
    2. Rajput, Fluid mechanics and fluid machines , S.Chand &Co.
    3. D.S. Kumar Kataria & Sons, Fluid Mechanics & Fluid Power Engineering , D.S. Kumar
Kataria & Sons.
    4. K R Arora, Fluid Mechanics, Hydraulics and Hydraulic Machines , Standard Publishers
    5. Kumar K.L., Engineering Fluid Mechanics, Eurasia Publishing House (P) Ltd., New Delhi,

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(AUTONOMOUS)

B.Tech - III Semester:	L	T	P	[C]
	3	1	0	[3]

(16CE1304) SURVEYING-I

Course Outcome:

At the end of the course the learners will be able:

1. To plan and organize a survey with least possible probable errors
2. To conduct surveying using various conventional instruments.
3. To perform angular measurements
4. To acquire technical operation of equipment viz., Compass, Level, etc., that are used in the construction industry.
5. To prepare contour map using levels.

Pre- requisite Courses: NONE

UNIT – I:

Basic Concepts: Surveying – History; Definition; primary divisions, Classification, Principles of surveying Plan and map; Basic Measurements; Instruments and Basic methods; units of measurement, Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision Sources and types of errors, theory of Probability, Rounding of numbers.

Chain Surveying: Instruments for chaining, Ranging out, chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy. Principles of chain surveying; Basic definitions; Well-Conditioned Triangle, Field book, Field work; Offsets, Cross Staff survey; obstacles in chain survey-problems, Conventional signs.

UNIT-II:

Compass Survey: Introduction, Bearings and angles, Designation of bearings, Conversion of bearings from one system to the other, fore bearing and back bearing, , Calculation of bearing from angles, Theory of Magnetic compass (i.e. Prismatic compass), Temporary adjustments of compass-Magnetic Declination, Local attraction-Related Problems-Errors in compass survey.

Plane Table Surveying: Introduction, Accessories, Working operations, Methods of plane tabling, three point problem-Mechanical method -Graphical method, Two point problem, Errors in plane tabling.

UNIT-III:

Leveling: 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 and 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-IV:

Computation of Areas and Volumes: methods of determining areas, areas by sub-division into triangles, areas from offsets to a base line: regular and irregular intervals, area by double meridian distances, area by co-ordinates. embankments and cutting for a level section, two level sections, three level section and multi level section, volume of earth work from contour plan, capacity of a reservoir , volume of barrow pits**.**

Traverse Surveying: Introduction, Selection and marking of traverse stations, methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Gale's traverse table, Omitted measurements.

Text Books:
1. Dr. K. R. Arora; Surveying Vol. 1, Standard Book House;2008, Surveying Vol. 2, Rajsons publications 10thedition 2010
2. Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications,15thedition,2005
3.SK.Duggal Surveying 4e, Tata Mcgrawhil

Reference Books:
1. AM Chandra, Plane Surveying , New Age International (P)Ltd.
2. S K Roy, Fundamentals of Surveying ,Prentice- Hall of India Private Ltd.
3. S.K. Duggal. Surveying Vol. 1and 2 , Tata Mc. Graw Hill Publishing Co.
4. Kanetkar T.P., and Kulkarni ,Surveying and Levelling by Vols. I and II, United Book Corporation, Pune, 1994.
5. Shahani, P.B., Text book of Surveying, Vol.I & II, Oxford & IBH Publications, 1998
6. S K Roy, . Fundamentals of Surveying, Prentice- Hall of India Private Ltd.

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR
(AUTONOMOUS)

B.Tech - III Semester:	L	T	P	[C]
	3	0	0	[3]

(16CE1305) ENGINEERING GEOLOGY

Course Outcome:
At the end of the course the learners will be able

1. To Assess the importance of weathering, caused by different geological agents.
2. To Identify and classify the different minerals and rocks based on their physical properties and geological genesis.
3. Identify geological structures
4. Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels
5. Identify subsurface information and groundwater potential sites through geophysical investigations

Pre- requisite Courses: NONE

UNIT – I:
Introduction: Importance of geology from Civil Engineering point of view, Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs.
Weathering of Rocks: Its effects over properties of rocks-importance of weathering with reference to dams, reservoirs and tunnels weathering of common rocks like "Granite".
Mineralogy: Definition of mineral- Importance of study of minerals- Different methods of study of minerals- Advantages of study of minerals by physical properties- Role of study of physical properties of minerals in the identification of minerals, Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kainite, Garnet, Talc, Calcite, Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chromite, Galena, Pyrolusite, Graphite, Magnesite and Bauxite

UNIT – II:
Petrology: Definition of rock, Geological classification of rocks into igneous, sedimentary and metamorphic rocks,Dykes and sills, common structures and textures of igneous, sedimentary and metamorphic rocks-Their distinguishing features, Megascopic study of granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Lime stone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT – III:
Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults Un conformities, and joints – their important types, Their importance Insitu and drift soils, common types of soils- their origin and occurrence in India, Earth quakes- their causes and effects, shield areas and seismic belts, 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, Importance of study of ground water, earth quakes and landslides.

Geology of Dams and Reservoirs: Types of dams and bearing Geology of site in their selection-

Geological Considerations in selection of a dam site, Analysis of dam failures of the past, Factor's contributing to the success of a reservoir, Geological factors influencing water Lightness and life of reservoirs.

Tunnels: Purposes of tunneling- effects of tunneling on the ground- Role of Geological considerations in tunneling over break and lining in tunnels.

UNIT – IV:

GROUND WATER & GEOPHYSICAL STUDIES: Ground water, water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration, Importance of geophysical studies- principles of geophysical study by Gravity methods, Magnetic methods, Electrical methods, Seismic methods, Radio metric methods and Geothermal method, Special importance of Electrical resistivity methods and seismic refraction methods, Improvement of competence of sites by grouting etc.

Text Books:
1. K.V.G.K Gokhale, Principals of Engineering Geology – B.S publications,2010
2. N. Chennkesavulu, Engineering Geology , Mc-Millian, India Ltd. 2005
3. D.Venkata Reddy, Engineering Geology ,Vikas Pubilcations, New Delhi**,**2nd Edition,2011

Reference Books:
1. Prabin Singh, Engineering geology .
2. F.G. Bell, Fundamental of Engineering Geology Butterworrths, Publications, New Delhi, 1992
3. Krynine &Judd, Prinicples of Engineering Geology &Geotecnics, CBS Publishers & Distribution,
4. Mukarjee, Engineering Geology , World Press.
5. Tony Waltham, Foundation of Engineering Geology , Special Indian Edition, CRC Press New
   Delhi.

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR

(AUTONOMOUS)

B.Tech - III Semester:	L	T	P	[C]
	0	0	3	[2]

(16CE2306) STRENGTH OF MATERIALS LAB

Course Outcome:

At the end of course student will be able to

1. Estimate compressive strength of wood/Concrete/Brick materials
2. Check the suitability of wood, steel and concrete in construction works.
3. Find the impact resistance of steel used in construction works.
4. Estimate young's modulus of wood/steel materials

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1302	Strength of Materials-I	3	0	0	3

List of Exercises /
Tests:

1. Tension test.
2. Bending test on simple support beam.
3. Bending test on continuous beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.

ListofMajorEquipment:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test.
3. Wooden beam for flexure test.
4. Torsion testing machine
5. Brinnel's/ Rocks hardness testing machine.
7. Compression testing machine
8. Izod Impact machine

9. Shear testing machine

10. Beam setup for Maxwell's theorem verification.

11. Continuous beam setup.

12. Electrical Resistance gauges

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B.Tech - III Semester:	**L**	**T**	**P**	**[C]**
	0	**0**	**3**	**[2]**

(16CE2307) ENGINEERING GEOLOGY LAB

Course Outcome:

At the end of course student will be able to

1. Identify minerals and rocks

2. Measure strike and dip of the bedding planes

3. Interpret geological maps

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1305	Engineering Geology	3	0	0	3

List of Exercises / Tests:

1. Study of Minerals by their Physical Properties

2. Identification and Textural Study of Rocks

3. Identification of Igneous Rocks

4. Identification of sedimentary rocks

5. Identification of metamorphic rocks

6. Study of Structural Problems.(Strike & Dip problems)

7. Study of Thickness Problems

8. Study of Geological Maps and their Cross-section

9. Study of Structural Models

10. Study of Tunnel Models

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR

(AUTONOMOUS)

B.Tech - III Semester:	**L**	**T**	**P**	**[C]**
	0	**0**	**3**	**[2]**

(16CE2308) SURVEY LAB –I

Course Outcomes:

1. To choose tools, measuring distances and directions of objects accurately and plotting.
2. To choose suitable technique, method and tools to perform field work accurately.
3. To prepare different profiles of ground along longitudinal and cross-section.
4. To procure knowledge in determining areas of field.
5. To work in field as a team member.

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1304	Surveying-I	3	0	0	3

LISTOFEXERCISES:

A)Chain Survey:

1. Study of chains and its accessories - Aligning, Ranging and Chaining

2. Cross staff survey and plotting

3. Chaining across obstacles and plotting

B)Compass Survey:

4. Study of prismatic compass – Measurement of bearings of lines

5. Determination of distance between two inaccessible points with comp6. Compass

traversing

(closed traverse) and plotting

C)Plane Table Survey:

7. Study of plane table and its accessories

8. Radiation and Intersection methods by plane table survey

9. Plane table traversing

10. Resection - Two point and three point problems

D)Leveling:

11. Study of Dumpy level/Auto level and leveling staff

12. Fly leveling (differential leveling)

13. Longitudinal and cross-sectioning of a road profile and plotting.

14. Contouring exercise

Reading:

1. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Surveying I & II, Laxmi

Publications, 2005.

2. Chandra A. M., Higher Surveying, New Age International Publishers, 2007.

3. Chandra A. M., Plane Surveying, New Age International Publ., 2007.

4. Charles D Ghilani, Paul R Wolf., Elementary Surveying, Prentice Hall, 2012.

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B.Tech - III Semester:	**L**	**T**	**P**	**[C]**
	0	**0**	**3**	**[1]**

(16AS3301) COMMUNICATION SKILLS PRACTICE

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR
(AUTONOMOUS)

B.Tech - III Semester:	**L**	**T**	**P**	**[C]**
	0	**0**	**3**	**[1]**

(16AS3302) PROFESSION SOCIETY ACTIVITIES-I

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR
(AUTONOMOUS)

B.Tech – IV Semester:	L	T	P	[C]
	3	1	0	[3]

(16HS1401) MATRICES AND NUMERICAL METHODS

Objectives:

To enable the students to learn

1. concepts of matrices ; reduction into diagonal form for ease of solution of various engineering problems
2. the methods of Bisection, Regula – Falsi and Newton–Raphson
3. the methods of Gauss elimination, LU-Decomposition and Gauss- Seidel Iterations
4. methods for interpolation and curve-fitting
5. various numerical methods for differentiation and integration
6. properties of vector differentiation and integration

Outcomes:

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

1. compute the rank of matrices ; solve the linear system of equations (homogeneous as well as non – homogeneous)
2. calculate the eigenvalues and eigenvectors of the matrices ; understand the complex matrix properties
3. solve problems using Cayley – Hamilton theorem ; reduce the given matrices into diagonal form ; reduce the matrices into canonical form by orthogonal transformation
4. solve exercises by N-R method ; get to know the concept of finite differences and apply to various engineering problems
5. analyze problems using Trapezoidal and Simpson's 1/3 rules ; solve first order ODEs using Euler's and R- K methods of 2nd and 4th order
6. gain the knowledge of vector differentiation and solve the problems of various engineering problems

UNIT I Matrices

Rank by Echelon and normal forms – Solution of system of linear equations – Eigenvalues and Eigenvectors - Cayley- Hamilton theorem (without proof) and its applications - Reduction to diagonal form – Quadratic forms – Reduction of Quadratic form to canonical form by orthogonal transformation and their nature

UNIT II Solutions of algebraic and transcendental equations

Solutions of algebraic and transcendental equations by Bisection, Regula – Falsi and Newton – Raphson Method - System of linear equations – Gauss elimination - LU decomposition Gauss – Seidel Iteration Method

UNIT III INTERP0LATION & CURVE FITTING

Newton's forward and backward interpolation formulae - Relations between difference operators – Lagrange's interpolation

Least squares curve fitting –fitting a straight line –non-linear curve fitting –Parabolic, Exponential and power function

UNIT IV Numerical Differentiation & Integration and Differential Equations

Formulae for derivatives - Numerical integration using Trapezoidal and Simpson's 1/3 rules - Numerical solutions of first order ODEs – Euler's, Runge - Kutta methods of 2nd and 4th orders – Milne's Predictor – Corrector Method

TEXT BOOKS
1. Higher Engineering Mathematics, Dr. B.S. Grewal – 42nd Edition - Khanna Publications
2. E. Rukmangadachari & E. Keshava Reddy ,Engineering Mathematics , Volume -   I & II, 2nd Edition-Pearson publishers

REFERENCE(S)

1. Introduction to Numerical Analysis – S. S. Sastry – Prentice Hall of India
2. Advanced Engineering Mathematics – E. Kreyzig – 10th Edition – Wiley Publications
3. A Text Book of Engineering Mathematics – I - T.K.V. Iyengar, B. Krishna Gandhi and Others - S. Chand & Company – Revised edition 2013
4. A Text Book of Engineering Mathematics, B.V. Ramana - Tata McGraw Hill Publications

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY: GUDUR
(AUTONOMOUS)

B.Tech – IV Semester:	L	T	P	[C]
	3	1	0	[3]

(16CE1401) STRENGTH OF MATERIALS-II

Course Outcomes:

1.Find the torsional moment of resistance and power transmitted by a shaft for a given shear.

2.Evaluate the resultant forces due to effect of combined bending and torsion on a bar and determine the deflection of close and open coiled helical springs under axial pull and axial couple

3.Calculate the longitudinal and circumferential stresses in thin cylinders and identify the location and orientation of principal planes on an element under a given loading

4.Determine the resultant stresses in the case of chimneys, retaining walls and dams and checking or their stability

5.Calculate the effective lengths and Euler bulking loads for the given column when end conditions are held in position, free, either restrained fully or partially

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1302	Strength of Materials-I	3	1	0	3

UNIT-I:

Theories of Failure: Maximum principal stress theory, Maximum principal strain theory, Maximum shear stress theory, Maximum strain energy theory, Maximum shear strain energy theory

Torsion: Theory of pure torsion, Derivation of Torsion equation: $T/J = q/r = G^\theta/l$, Assumptions made in the theory.   Theory of pure torsion,Torsional moment of resistance, Polar section modulus, Power transmitted by shafts, Combined bending and torsion

Springs: Introduction, Types of springs, Deflection of close coiled helical spring under axial load and axial torque

UNIT- II:

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – Changes in diameter, and volume of thin cylinders – Thin spherical shells.

Thick Cylinders: Introduction Lame's theory for thick cylinders – Derivation of Lame'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- III:
Columns and Struts: Introduction, Classification of Columns, Failure of a Column, Euler's theorem for long columns- assumptions- derivation of Euler's critical load formula for various end conditions, Equivalent length of a column, Slenderness ratio- Euler's critical stress- limitations of Euler's theorem, Rankine- Gordon formula-Long columns subjected to eccentric loading, Prof. Perry's formula.
Direct and Bending Stresses: Stresses under the combined action of direct loading and bending moment, Kernel 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 axis.

UNIT-IV:
Strain Energy: Introduction, Strain energy in linear elastic system, Resilience, strain energy due to different types of loads, expression of strain energy due to axial load, bending moment and shear forces
Energy Theorems and Energy Principles: Introduction, Principle of super position, Maxwell Reciprocal theorem, Betti's theorem, Castigliano's theorems I & II, The Muller – Breslau Principle.

Text Books:
 1.R. K. Bansal, Strength of materials ,Lakshmi Publications, 5th Edition, 2012.
 2.R. K. Rajput, Strength of Materials ,S. Chand and Co., New delhi.1999
 3.S. S. Bhavikatti, Strength of Materials I & II ,New Age Publications,20123.
 4.Popov E P, "Engineering Mechanics of Solids", SI Version, Prentice Hall, New Delhi.

Reference books:
 1.Strength of Materials and mechanics of solids Vol-1 & 2 by B.C. Puunmia, Laxmi Publications,
 New Delhi,2013
 2.Theory of structures by Ramamuratam,jain book depot , New Delhi
 3.James M. Gere, Stephen Timoshenko, Mechanics of materials, CBS Publisher ,2004.
 4.Timoshenko S P and Young D H, "Elements of Strength of Materials", East West Press,New Delhi.
 5.Shames, I. H., Pitarresi, J. M., "Introduction to Solid Mechanics," Prentice-Hall, NJ.

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(AUTONOMOUS)

B.Tech – IV Semester:	L	T	P	[C]
	3	1	0	[3]

(16CE1402) HYDRAULICS AND HYDRAULIC MACHINERY

Course Outcomes:

1. Understand the types of channels, design of most economical channel sections
2. Analyze the critical flow condition and hydraulic jump concept.
3. Determine the velocity and rate of flow in open channels
4. Selection of type of turbine required with reference to available head of water and also used for Identification of type of turbine with estimated specific speed.
5. Estimation of efficiency and performance of the turbine with the study of characteristics curves.
6. Estimation of efficiency of different pumps and performance of the pumps with the study of characteristics curves.
7. Useful for the classification of flows and helps difference between model and actual structure

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1303	Fluid Mechanics	3	1	0	3

UNIT- I:

Open Channel Flow – Uniform Flow: Introduction, Comparison between open channel flow and pipe flow Classification of flows, Types of channels; Flow analysis: The Chezy equation, Empirical formulae for the Chezy constant, Hydraulically efficient channel sections: Rectangular, Trapezoidal, Triangular and Circular channels; Velocity distribution; Energy and momentum correction factors. Application of Bernoulli's equation to open channel flow.

Open Channel Flow – Non-Uniform Flow: Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; discharge curve, Different slope conditions; Channel transitions- Reduction in width of a rectangular channel, Raised bottom in a rectangular channel, venture flume, Momentum principle applied to open channel flow; Measurement of Discharge and Velocity, Specific force; Specific force curve.s

UNIT-II:

Open Channel Flow – Gradually Varied Flow: Introduction, Dynamic equation; Dynamic equation for GVF in wide Rectangular channel, classification of channel bottom slopes, Surface Profiles; Characteristics of surface profiles, Back water Curves and Draw down

curves; Examples of various types of water surface profiles; Control section, Computation of surface profiles by single step method.

Open Channel Flow – Rapid Varied Flow: Hydraulic jump; Elements and characteristics of hydraulic jump; Hydraulic jump in rectangular channels, height and length of the jump, Energy loss in a hydraulic jump, Types of hydraulic jump; applications of hydraulic jump; Location of hydraulic jump,.

UNIT -III:
Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Torque and head transferred in roto dynamic machines.

Hydraulic Turbines-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; pelton wheel: parts, Velocity triangles, work done and efficiency, working proportions, design of pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

Hydraulic Turbines-II: Francis turbine: main components and working, work done and efficiencies, design proportions; design of Francis turbine runner. Kaplan turbine: main components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitations: causes, effects.

UNIT – IV:
Dimensional Analysis and Similitude: Introduction, dimensions; Dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method; Buckingham – Pi theorem; model analysis; similitude- types of similarities; Dimensionless numbers; Model laws ;Partially submerged objects; types of models; Scale effect

Centrifugal Pumps: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming ;specific speed; limitation of suction lift, net positive suction head(NPSH);Performance and characteristic curves; Cavitation effects ;Multistage centrifugal pumps; troubles and remedies

Boundary Layer Theory & Drag and Lift: Boundary layer – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL. expression for drag and lift; Lift and Drag Coefficients; pressure drag and friction drag; Streamlined and bluff bodies.

TexBooks:

1. P. N. Modi & S. N. Seth "Hydraulics & Fluid Mechanics", Standard Book house, New Delhi
2. Dr. R. K. Bansal "Fluid Mechanics & Hydraulic Machines" Laxmi Publications, New Delhi.

ReferenceBooks:

1. K. Subramanya "Open channel flow", TMH Publishers
2. V.T.Chow "Open Channel flow", Mc.Graw Hill Book Company.
3. Ranga Raju "Elements of Open channel flow", Tata Mc.Graw Hill, Publications.
4. A. K. Jain "Fluid Mechanics", Khanna Publishers, Delhi
5. Rajput "Fluid mechanics and fluid Machines" by, S.Chand &Co.
6. Banga & Sharma "Hydraulic Machines", Khanna Publishers.

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B.Tech – IV Semester:	L	T	P	[C]
	3	1	0	[3]

(16CE1403) SURVEYING-II

Course Outcomes:

At the end of the course the learners will be able:
1. Perform angular measurement and measure the elevation of an object.
2. Set out the curves of given size on the field
3. Acquire technical operation of equipment viz., , Theodolite, Tacheometer and Total station that are used in the construction industry
4. Perform tachometric surveying for distance and height measurements prepare contour map using tachometric surveying
5. Understand procedures of triangulation
6. Apply trigonometric principles to determine levels & distances.

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1304	Surveying-I	3	1	0	3

UNIT-I:
Theodolite: Vernier Thedolite: 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.
Minor Instruments: uses and working of the minor instruments: hand level, line ranger, optical square, abney level, clinometer, ceylon ghattracer, pantagraph, sextant and planimeter.

UNIT-II:
Trigonometric Leveling: Introduction; Determination of the level of the top of an object, When its base is accessible and When its base is not accessible; Determination of the height of the object when the two instrument stations are not in the same vertical plane; Axis signal correction; Difference in elevation by single observation and reciprocal observations.
Tacheometric Surveying: Definition, Advantages of Tacheometric surveying- Basic systems of tacheometric measurement , Principle of stadia measurements, 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, Subtanse bar, Errors in Tacheometry.

UNIT-III:
Triangulation: Principles of triangulation, Uses of triangulation survey; Classification of triangulation; operations of triangulation survey.
Curves: Simple curves–Definitions and Notations, designation of a curve, Elements of simple curves, location of tangent points, selection of peg interval, Methods of setting simple curves(based on equipment) – Rankines method, Two theodolite method. Compound curves – Elements of compound curve, setting out compound curve. Reverse curves – Elements of reverse curve, relationship between various elements.

UNIT-IV:
Advanced Surveying Instruments: EDM instruments, electronic theodolites, total station-models, fundamental measurements, recording, traversing, data retrieval.
Setting out works: General horizontal and vertical control, setting out of foundation plan for load bearing and framed structure, batter board, slope and grade stakes, setting out with theodolite. Setting out of sewer line, culvert, use of laser for works. Setting out center line for tunnel, transfer of levels to underground work Project / route survey for bridge, dam and canal. Checking verticality of high rise structures.

Text Books:
1. Dr. K. R. Arora; Surveying Vol. 1, Standard Book House;2008, Surveying Vol. 2, Rajsons publications 10thedition 2010
2. Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications,15thedition,2005

Reference Books:
1. AM Chandra, Plane Surveying , New Age International (P)Ltd.
2. S K Roy, Fundamentals of Surveying ,Prentice- Hall of India Private Ltd.
3. S.K. Duggal. Surveying Vol. 1and 2 , Tata Mc. Graw Hill Publishing Co.
4. Kanetkar T.P., and Kulkarni ,Surveying and Levelling by Vols. I and II, United Book Corporation, Pune, 1994.
5. Shahani, P.B., Text book of Surveying, Vol.I & II, Oxford & IBH Publications, 1998
6. S K Roy, . Fundamentals of Surveying, Prentice- Hall of India Private Ltd.

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B.Tech – IV Semester:	L	T	P	[C]
	3	1	0	[3]

(16CE1404) CONCRETE TECHNOLOGY

Course Outcomes:
At the end of the course the learners will be able
1. To attain knowledge of all available ingredients of concrete and have a comprehensive Overview their mechanism in concrete.
2. To identify different types of concrete.
3. To attain Have good knowledge of the concrete materials and the main operations of concreting
4. To Acquire the skill of testing, supervision of concrete work & interpretation of tests results
5. Broadening the knowledge to new concrete types and their design methods.
6. To procure knowledge on Testing and application conditions, further to modern trends in concrete technology and also on concrete with special properties such as e.g. high-quality, high strength, self-compressing, light, heavy concrete and further concretes with increased endurance against aggressive surrounding

Pre- requisite Courses: NONE

UNIT-I:
Cement: Manufacture of Portland cement by dry process, approximate oxide composition limits of OPC, Bogue's compounds, heat liberation from a setting cement, structure of hydrated cement, water requirements for hydration. Ordinary Portland cement, Rapid hardening cement, Sulphate resisting cement, Slag cement, Quick setting cement, Super sulphated cement, Portland pozzolana cement, air entraining cement, Coloured cement, expansive cement, High alumina cement.

Testing and Handling of Cement: Field tests for cement, Fineness of cement using sieve test and air-permeability method, Normal consistency and setting times using vicat apparatus, soundness test using Le-chatlier apparatus, Grades of cement as per IS specifications, physical and chemical requirements of OPC for different grades of cement, storage of cement in sheds and silos, Transportation of cement, Safety while handling cement, Uses of cement.

Aggregates: Classification of aggregates – Particle shape and texture – Bond, Strength & other mechanical properties of aggregates (i) Specific gravity (ii) Bulk density (iii) porosity (iv) Absorption (v) Moisture content – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis –

Fineness modulus – Grading curves – Grading of fine & coarse aggregate – Gap graded aggregate – Maximum aggregate size.

UNIT-II:
Water: Quality of water for mixing concrete, Tolerable concentrations of some impurities in mixing water, permissible limit for solids as per IS456-2000, use of sea water for mixing concrete.

Admixtures: General, plasticizers and super plasticizers – Dosage, mixing procedure, equipment, and effect of super plasticizes on the properties of hardened concrete, Retardors, accelerators. Air- entraining admixtures, factors affecting amount of air-entrainment, effect of air entrainment on the properties of concrete, fly ash, effect of fly ash on fresh and hardened Concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on Compressive strength of concrete, construction chemicals for curing, construction chemicals for Water proofing.

Fresh Concrete: Workability, factors affecting workability, slump test, Kelly ball test, V-B test, compaction factor test, segregation, bleeding,laittence, volume batching and weigh batching, hand mixing, machine mixing, mixing time, compaction of concrete, hand compaction, compaction by vibration, internal vibrator, form work vibrator, table vibrator, platform vibrator, surface vibrator.

UNIT-III:
Hardened Concrete: General; water-cement ratio; Abram's Law, gel/space ratio; gain of strength with age;maturity concept of concrete; effect of maximum size of aggregate on strength.

Test On Hardened Concrete: Compression test; moulds and compacting; curing; failure of compression specimen; effect of height/diameter ration strength; flexural strength of concrete; tensile strength of concrete; non-destructive testing methods

Elasticity, Creep And Shrinkage: Elastic properties of aggregate, Factor's affecting modulus of elasticity, poisson's ratio, creep and factors affecting creep, shrinkage and factors affecting shrinkage.

Durability of Concrete: Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

UNIT-IV:
Introduction to Special Concretes and Concreting Methods:

a) Fibre reinforced concrete: Fibres used, factors effecting properties, aspect ratio of fibres, Orientation of fibres, workability, mixing, applications, current development in FRC.
b) No-fines concrete: mix proportion, drying shrinkage, Thermal conductivity, applications.
c) Ferrocement: Casting techniques, hand plastering, semi -mechanized process, Centrifuging, guniting, applications.

d) Light-weight concrete: Natural and artificial light-weight aggregates, properties of common
Light-weight concretes.
e) High performance concrete:
Mix design: Factors in the choice of mix proportions – Durability of concrete – Quality control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

SPECIAL CONCRETING TECHNIQUES: Pipe Crete concrete; under water concreting, concreting in extreme weather Conditions.

Text Books:
1. A.M.Neville "Properties of Concrete", Pearson publication – 4th editions
2. M.S.Shetty "Concrete Technology", S.Chand & Co.; 2004
3. M.S.Shetty "Concrete Technology", Pearson publication

Reference Books:
1. M.L. Gambhir "Concrete Technology", Tata Mc. Graw Hill Publishers, New Delhi
2. A.R. Santha Kumar "Concrete Technology", Oxford university Press, New Delhi
3. J.Prasad & C.G.K. Nair "Non-Destructive Test and Evaluation of Materials" by, Tata Mcgraw hill Publishers, New Delhi
Web references:
http://nptel.ac.in/courses/105104030/
http://nptel.ac.in/courses/105102012/
http://www.nptel.ac.in/courses/105108124/4
Wikipedia

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B.Tech – IV Semester:	L	T	P	[C]
	3	1	0	[3]

(16CE1405) ENVIRONMENTAL ENGINEERING

Course Outcome:

At the end of the course, the student will be able to:
1. Recognise that water supply and sanitation is an important professional and ethical responsibility of civil and environmental engineer.
2. Understanding of the basic principles behind each water treatment unit and design simple water treatment units.
3. Understanding of the distribution system and estimate head loss in water distribution pipe networks.
4. To apply the concepts of BOD,COD and TOC in sewerage systems and design of sewers and design the various treatment in waste water treatment plants.
5. Recognize the importance of wastewater treatment to protect the water resources which is facing a continuous degradation in water quality.
6. Prepare the layout of water and wastewater treatment plants and involve in mega projects where water and wastewater treatment is essential.

Pre- requisite Courses:

Code	Course	L	T	P	C
16HS1104	Applied Chemistry	3	1	0	3
16HS1105	Environmental Studies	3	0	0	3

UNIT – I:

Water Demand and Quantity Studies: Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies.
Quality and Analysis of Water: Characteristics of water, Physical, Chemical and Biological. Analysis of Water, Physical, Chemical and Biological. Impurities in water, Water borne diseases. Drinking water quality standards.

UNIT – II:

Water Treatment: Layout and general outline of water treatment units, sedimentation, principles , design factors , coagulation, flocculation clarifier design , coagulants , feeding arrangements. Filtration and Chlorination: Filtration , theory , working of slow and rapid gravity filters , multimedia filters , design of filters , troubles in operation of filters ,

disinfection , theory of chlorination, chlorine demand, other disinfection practices, Miscellaneous treatment methods.

Water Distribution : Distribution systems , Requirements, Layout of Water distribution systems , Design procedures, Hardy Cross and equivalent pipe methods, service reservoirs , joints, valves such as sluice valves, air valves, scour valves and check valves, water meters , laying and testing of pipe lines , pump house, waste detection and prevention.

UNIT – III:

Introduction to Sanitation :systems of sanitation , relative merits & demerits , collection and conveyance of waste water , sewerage , classification of sewerage systems, Estimation of sewage flow and storm water drainage , fluctuations , types of sewers , Hydraulics of sewers and storm drains, design of sewers , materials for sewers, appurtenances in sewerage , cleaning and ventilation of sewers.

Waste Water Collection and Characteristics : Conservancy and water carriage systems , sewage and storm water estimation , time of concentration , storm water overflows combined flow , characteristics of sewage , cycles of decay , decomposition of sewage, examination of sewage , B.O.D. , C.O.D. equations.

UNIT – IV:

Waste Water Treatment: Layout and general outline of various units in a waste water treatment plant , primary treatment: design of screens , grit chambers , skimming tanks , sedimentation tanks , principles of design , biological treatment , trickling filters , standard and high rate , Construction and design of Oxidation ponds.

Sludge Treatment: Sludge digestion, factors effecting, design of Digestion tank, Sludge disposal by drying, septic tanks and Imhoff Tanks, working principles and design, soak pits.

Text Books:

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.

2. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi

3. Water supply and sanitary Engineering by
S.K.Garg,

Reference books:

1. Water and Waste Water Technology by Mark J Hammar and Mark J. HammarJr.

2. Environmental Science and Engineering by J.G.Henry and G.W.Heinke, Person Education..

4. Water and Waste Water Engineering by Fair Geyer
anOkun

5. Waste water treatment, concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India.

6. Waste water engineering by Metcalf and Eddy.

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B.Tech – IV Semester:	**L**	**T**	**P**	**[C]**
	0	**0**	**3**	**[2]**

(16ME2307) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Outcomes:

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1303	Fluid Mechanics	3	1	0	3
16CE1402	Hydraulics and Hydraulic Machinery	3	1	0	3

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B.Tech – IV Semester:	L	T	P	[C]
	0	0	3	[2]

(16CE2406) CONCRETE TECHNOLOGY LAB

Course Outcomes:
1. Conduct Quality Control tests on concrete making materials
2. Conduct Quality Control tests on fresh & hardened concrete
3. Design and test concrete mix
4. Conduct Non-destructive tests on concrete

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1404	Concrete Technology	3	0	0	3

TEST ON CEMENT:
1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Bulking of sand.

TEST ON FRESH CONCRETE :
1. Slump Test
2. Flow table Test
3. Compaction factor Test
4. Vee-Bee Consistometer Test

TEST ON HARDENED CONCRETE:
1. Compression test on Concrete
2. Tensile test on Concrete
3. Flexural Strength on Concrete
4. Non- Destructive testing on concrete (for demonstration).
5. Mix Design: IS Code method.

Reading:
1. Properties of Concrete, AM Nevelli – 5th Ed, Prentice Hall Publishers, 2012.
2. Concrete Technology, M. S. Shetty – S Chand Co., Publishers, 2006.
3. Concrete Technology, M. L. Gambhir – Tata Mc Graw Hill Publishers, 2012.

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B.Tech – IV Semester:	L	T	P	[C]
	0	0	3	[2]

(16CE2407) SURVEY LAB-II

Course Outcomes:
1. To determine horizontal and vertical angles.
2. To determine the elevations and horizontal distances.
3. To set out simple curve using theodolite.
4. To work in field as a team member.
5. To procure overview of applications of conventional and modern instruments viz., Total station.

Pre- requisite Courses:

Code	Course	L	T	P	C
16CE1304	Surveying-I	3	1	0	3
16CE2308	Survey lab –I	0	0	3	2
16CE1403	Surveying-II	3	1	0	3

LIST OF EXERCISES:

1. Study of theodolite - Measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and method of reiteration.
3. Finding out distance between two inaccessible points.
4. Trigonometric leveling - Measurement of heights and distances (Two Exercises)
5. Tacheometric surveying - Measurement of heights and distances (Two Exercises)
6. Setting out a circular curve by Rankine's method of tangential angles.
7. Setting out a circular curve by Double Theodolite method.
8. Study of total station - Measurement of horizontal angles, vertical angles and distances
9. Determination of area using total station.
10. Determination of remote height using total station.
11. Distance, gradient, and differential height between two inaccessible points using total station.
12. Stake-out using total station.
13. Traversing using total station.
14. Contouring using total station.