AR - 20

COURSE STRUCTURE
AND
DETAILED SYLLABUS
(I-I, I-II, II-I, II-II, III-I & III-II Sems Syllabus)
&
Academic Regulations

CIVIL ENGINEERING

For

B. TECH. FOUR YEARS DEGREE PROGRAMME

(Applicable for the batches admitted from 2020-21)

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

Approved By AICTE, New Delhi
Recognized under 2(f),12(b) of UGC
Permanently Affiliated to JNTUK, Kakinada.
Accredited by NBA (UG Programs; CSE, ECE, EEE, ME, CE & IT)
Accredited by NAAC (UGC) with A+ Grade
K. Kotturu, TEKKALI-532 201, Srikakulam, Andhra Pradesh

VISION OF THE INSTITUTE

To evolve into a premier engineering institute in the country by continuously enhancing the range of our competencies, expanding the gamut of our activities and extending the frontiers of our operations.

MISSION OF THE INSTITUTE

Synergizing knowledge, technology and human resource, we impart the best quality education in Technology and Management. In the process, we make education more objective so that the efficiency for employability increases on a continued basis.

VISION OF THE DEPARTMENT

To become a pioneer in the field of civil engineering by providing high quality education and research to serve the public consistently with competitive spirit professional ethics.

MISSION OF THE DEPARTMENT

1. Provide quality knowledge and advance skills to the students in order to expertise theoretically and practically in the areas of civil engineering.
2. Improve the professional potentiality of the students and staff through educational programs to expand the knowledge in the field of civil engineering
3. Inculcate healthy competitive spirit towards the higher education and successful career in the field of civil engineering to serve the nation ethically.
4. Provide students and faculty with opportunities to create, disseminate and apply knowledge by maintaining a state of the art research.

PROGRAM EDUCATIONAL OBJECTIVES

On successful completion of B. Tech. Civil Engineering program graduates will

1. PEO1. Be employed as a practicing civil engineer in construction, design, testing and allied fields.
2. PEO2. Engage in self-directed learning research or to undertake higher studies in the rapidly changing civil engineering environment.
3. PEO3. Create new methods / processes to meet the needs of the society with their civil engineering knowledge.
4. PEO4. Create themselves as ethical and responsible professionals with good communication skills and demonstrate leadership skills**.**

PROGRAM OUTCOMES

Engineering graduates will be able to

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

On successful completion of B. Tech. Civil Engineering programme graduates will be able to

1. Analyze, design and execute the civil engineering structures with good knowledge in engineering, mathematics & basic sciences
2. Survey, map, plan & layout of infrastructures viz. canals, roads, etc. and apply knowledge of environmental & geotechnical engineering
3. Acquire knowledge of various techniques, skills and engineering tools required for civil engineering structures including all types of buildings, irrigation structures, highways, railways, docks &harbours etc.

Aditya Institute of Technology an Management, Tekkali
R20 – COURSE STRUCTURE (1ST B.Tech.)
(Proposed for CIVIL)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B. Tech. (1st Sem)	MC	20MCT101	Induction Program	3 weeks			0.0
	HSSC	20HST101	English	3	0	0	3.0
	BSC	20BST101	Linear Algebra and Calculus	2	1	0	3.0
	BSC	20BST106	Engineering Physics	3	0	0	3.0
	ESC	20ES101	Basic Electrical Engineering	3	0	0	3.0
	ESC	20ESL102	Workshop and Manufacturing practice	1	0	4	3.0
	HSSC	20HSL101	Language Proficiency Lab	0	0	3	1.5
	BSC	20BSL101	Physics Lab	0	0	3	1.5
	ESC	20ESL101	Basic Electrical Engineering Lab	0	0	3	1.5
Total				**12**	**1**	**13**	**19.5**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B. Tech. (2nd Sem)	MC	20MCT102	Environmental Science	2	0	0	0.0
	BSC	20BST102	Differential Equations	2	1	0	3.0
	BSC	20BST107	Chemistry	3	0	0	3.0
	PC	20CET101	Surveying and Geomatics	3	0	0	3.0
	ESC	20ESI102	Programming for Problem Solving	3	0	3	4.5
	ESC	20ESL103	Engineering Graphics & Design	1	0	4	3.0
	BSC	20BSL102	Chemistry Lab	0	0	3	1.5
	PC	20CEL101	Surveying Lab – 1	0	0	3	1.5
Total				**14**	**1**	**13**	**19.5**

Category	Subjects (T/L)	Credits
Mandatory Courses	2/0	0.0
Humanities and Social Science Courses	1/1	4.5
Basic Science Courses	4/2	15.0
Engineering Science Courses	4/2	15.0
Professional Core Course	1/1	4.5
Total	**12/6**	**39.0**

I: Integrated theory

Aditya Institute of Technology an Management, Tekkali
R20 – COURSE STRUCTURE (2nd B.Tech.)
(Proposed for CIVIL)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
II B. Tech. (1st Sem)	MC	20MCT203	Constitution of India	2	0	0	0.
	ESC	20EST203	Engineering Mechanics	3	0	0	3.0
	PC	20XXT202	Professional Core – 2	2	1	0	3.0
	PC	20XXT203	Professional Core – 3	3	0	0	3.0
	PC	20XXT204	Professional Core – 4	3	0	0	3.0
	PC	20XXT205	Professional Core – 5	3	0	0	3.0
	PC	20XXL202	Professional Core Lab – 2	0	0	3	1.5
	PC	20XXL203	Professional Core Lab – 3	0	0	3	1.5
	PC	20XXL204	Professional Core Lab – 4	0	0	3	1.5
	SC	20SCP21X	Skill Oriented Course – I	1	0	2	2.0
Total				**17**	**1**	**11**	**21.5**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
II B. Tech. (2nd Sem)	BSC	20BST203	Complex Variables and Statistical Methods	3	0	0	3.0
	ESC	**20ESI204**	Python Programming	3	0	3	4.5
	PC	20XXT206	Professional Core – 6	2	1	0	3.0
	PC	20XXT207	Professional Core – 7	3	0	0	3.0
	PC	20XXT208	Professional Core – 8	3	0	0	3.0
	PC	20XXL205	Professional Core Lab – 5	0	0	3	1.5
	PC	20XXL206	Professional Core Lab – 6	0	0	3	1.5
	SC	20SCP22X	Skill Oriented Course – II	1	0	2	2.0
Total				**15**	**0**	**11**	**21.5**
Internship 2 Months (Mandatory) during summer vacation							
Honors/Minor Courses (The hours distribution may be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4.0**

Category	Subjects (T/L)	Credits
Mandatory Courses	1/0	0.0
Basic Science Courses	1/0	3.0
Engineering Science Courses	2/1	7.5
Professional Core Course	7/5	28.5
Interdisplinary Elective	0/0	0.0
Skill Course	2/0	4.0
Total	**13/6**	**43.0**

I: Integrated theory

Aditya Institute of Technology an Management, Tekkali
R20 – COURSE STRUCTURE (3rd B.Tech.)
(Proposed for CIVIL)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
III B. Tech. (1st Sem)	MC	20MCT304	Human Values	2	0	0	0.0
	PC	20XXT309	Professional Core – 9	3	0	0	3.0
	PC	20XXT310	Professional Core – 10	3	0	0	3.0
	PC	20XXT311	Professional Core – 11	3	0	0	3.0
	PE	20XXE31X	Professional Elective – I	3	0	0	3.0
	OE	20IET31X	Interdisplinary Elective – I	3	0	0	3.0
	PC	20XXL307	Professional Core Lab – 7	0	0	3	1.5
	PC	20XXL308	Professional Core Lab – 8	0	0	3	1.5
	SC	20SCP33X	Skill Advanced Course – I	1	0	2	2.0
	I/P	20XXP301	Internship – I	0	0	0	1.5
Total				**18**	**0**	**8**	**21.5**
Honors/Minor Courses (The hours distribution may be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4.0**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
III B. Tech. (2nd Sem)	PC	**20XXI312**	Professional Core – 12	3	0	3	4.5
	PC	20XXT313	Professional Core – 13	3	0	0	3.0
	PE	20XXE32X	Professional Elective – II	3	0	0	3.0
	PE	20XXE33X	Professional Elective – III	3	0	0	3.0
	OE	20IET32X	Interdisplinary Elective – II	3	0	0	3.0
	PC	20XXL309	Professional Core Lab – 9	0	0	3	1.5
	HSSC	20HSL302	Professional Communication Skills Lab	0	0	3	1.5
	SC	20SCP34X	Skill Advanced Course – II	1	0	2	2.0
Total				**16**	**0**	**11**	**21.5**
Industrial/Research Internship 2 Months (Mandatory) during summer vacation							
Honors/Minor Courses (The hours distribution may be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4.0**

Category	Subjects (T/L)	Credits
Humanities and Social Science Courses	0/1	1.5
Basic Science Courses	0/0	0.0
Professional Core Course	5/4	21.0
Professional Core Elective	3/0	9.0
Interdisplinary Elective	2/0	6.0
Skill Course	2/0	4.0
Internship/Project	1/0	1.5
Total	**13/5**	**43.0**

I: Integrated theory

Aditya Institute of Technology an Management, Tekkali
R20 – COURSE STRUCTURE (4th B.Tech.)
(Proposed for CIVIL)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
IV B. Tech. (1st Sem)	HSSC	20HST403	MEMS	3	0	0	3.0
	PC	20XXT414	Professional Core – 14	3	0	0	3.0
	PE	20XXE44X	Professional Elective – IV	3	0	0	3.0
	PE	20XXE45X	Professional Elective – V	3	0	0	3.0
	OE	20OET41X	Open Elective	3	0	0	3.0
	SC	20SCP451	Soft Skills	1	0	2	2.0
	PC	20XXL408	Professional Core Lab – 10	0	0	3	1.5
	PC	20XXL409	Professional Core Lab – 11	0	0	3	1.5
	I/P	20XXP402	Internship – II	0	0	0	3.0
Total				**16**	**0**	**8**	**23.0**
Honors/Minor Courses (The hours distribution may be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4.0**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
IV B. Tech. (2nd Sem)	I/P	20XXP403	Project work, Seminar and Internship (6 months) in industry	0	0	0	12.0
Total							**12.0**

Category	Subjects (T/L)	Credits
Humanities and Social Science Courses	1/0	3.0
Professional Core Course	1/2	6.0
Professional Core Elective	2/0	6.0
Open Elective	1/0	3.0
Skill Course	1/0	2.0
Internship/Project	2/0	15.0
Total	**8/2**	**35.0**

I: Integrated theory

NOTE: **L: Lecture** **T: Tutorial** **P: Practical** **C: Credits**

HSMC: **Humanities and Social Sciences including Management courses**
BS: **Basic Science courses**
ES: **Engineering Science courses**
PC: **Professional core courses**
PE: **Professional Elective**
IE: **Interdisciplinary Electives**
PCL: **Professional core Lab**
Project: **Project work, Seminar, Internship etc**

Aditya Institute of Technology an Management, Tekkali
R20 – COURSE STRUCTURE
(Proposed for CIVIL)

Category	Subjects (T/L)		Credits
Mandatory Courses	4/0		0.0
Humanities and Social Science Courses	2/2		9.0
Basic Science Courses	5/2		18.0
Engineering Science Courses	6/3		22.5
Professional Core Course	14/12		60.0
Professional Core Elective	5/0		15.0
Interdisciplinary Elective/Open Elective	3/0		9.0
Skill Course	5/0		10.0
Internship/Project	3/0		16.5
Total	**47/19**		**160.0**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B. Tech. (1st Sem)	MC	20MCT101	Induction Program	3 weeks			0.0
	HSSC	20HST101	English	3	0	0	3.0
	BSC	20BST101	Linear Algebra and Calculus	2	1	0	3.0
	BSC	20BST106	Engineering Physics	3	0	0	3.0
	ESC	20ES101	Basic Electrical Engineering	3	0	0	3.0
	ESC	20ESL102	Workshop and Manufacturing practice	1	0	4	3.0
	HSSC	20HSL101	Language Proficiency Lab	0	0	3	1.5
	BSC	20BSL101	Physics Lab	0	0	3	1.5
	ESC	20ESL101	Basic Electrical Engineering Lab	0	0	3	1.5
Total				**12**	**1**	**13**	**19.5**

ENGLISH

(For CSE / IT / CE / ME)

Course Code: 20HST101

L	T	P	C
3	0	0	3

Course Objectives

- To enable students build vocabulary appropriate to their levels and to make students understand printed texts of different genres
- To enhance basic writing skills of the students in different forms of written communication
- To assist students implicitly synthesize the rules of grammar for the production of accurate sentences
- To help students learn rules of using punctuation marks and prepositions appropriately in writing
- To aid students acquire appropriate and adequate letter writing skills
- To get students develop reading skills and enhance their essay writing skills

Course Outcomes

- Students will be able to comprehend printed texts of different genres more easily and they will be able to make appropriate word choice.
- Students will be able to write short texts masterly.
- Students will be able to construct grammatically correct sentences.
- Students will be able to use punctuation marks and prepositions correctly in speech and writing.
- Students will be able to communicate through letters and emails effectively.
- Students will be able to comprehend unfamiliar passages, and will be able to write *essays.*

Course Syllabus

Unit–I: Father's Help by R K Narayan
Synonyms and Antonyms — One-word substitutes
Unit–II: My Early Days by A P J Abdul Kalam
Tense— Voice — *If* clauses
Unit-III: The Road Not Taken by Robert Frost
Reported Speech—Degrees of Comparison — Simple, Compound, Complex Sentences
Unit–IV: Politics and the English Language by George Orwell
Punctuation —Prepositions
Unit–V: Mother's Day by J. B. Priestly
Letter Writing — E-mail Writing
Unit–VI: Chipko Movement
Reading Comprehension—Essay Writing

Suggested Readings:

1. On Writing Well. William Zinsser. Harper Resource Book. 2001
2. Practical English Usage. Michael Swan. Oxford University Press. 1995.
3. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
4. Hugging the Trees: The Story of the Chipko Movement. Thomas Weber. Viking Publishers, New Delhi, 1988.

Linear Algebra and Calculus
(Common to All)

Course Code: 20HST101

L	T	P	C
2	0	0	3

Course Objectives:

- Understand the process of calculation of rank, solution of System of Linear Homogeneous and Non Homogeneous equations by Gauss Elimination method.
- Learn the process of calculating the Eigen values, Eigenvectors and Quadratic Forms.
- Understand the concepts of multiple integrals and their usage.
- Learn the properties of Gamma and Beta Functions, their relation and evaluation of improper integrals.
- Understand the concepts of gradient, divergence, curl of scalar and vector point functions.
- Understand and calculate Line Integral, Surface Integral, Volume Integral, concepts of Green's, Stokes and Gauss Divergence theorems in converting one integral form to another

Course Outcomes: The student will be able to:

- Calculate the rank and solve linear homogeneous and non homogeneous equations by Gauss Elimination method.
- Calculate eigen values, eigen vectors and estimate the nature of the matrix..
- Evaluate multiple integral in both Cartesian and polar coordinates.
- Apply Beta and Gamma functions to solve improper integrals.
- Calculate gradient, divergence, curl of a scalar and vector point functions and derive vector identities.
- Solve a Line Integral, Surface Integral, Volume Integral, apply Green's, Stokes and Gauss Divergence theorems in converting one integral form to another.

UNIT-I: Linear System of Equations (8 hrs)

Matrices – Rank- echelon form – Normal form – System of Linear Homogeneous and Non Homogeneous equations – Gauss Elimination method- Applications- Matrix representation for a Graph- Current in an electrical circuit.

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UNIT-II: Eigen Values, Eigen Vectors, Quadratic Forms (8 hrs)

Eigen values – Eigenvectors – Properties (an over view)- Diagonalization- Quadratic Forms- Reduction of Quadratic Forms to Canonical Form- Rank-Nature-Index-Signature.

UNIT-III: Multiple Integrals (8 hrs)

Double integral (Cartesian and polar form) -Change of order of integration -Change of variables (Cartesian to polar)- Triple integrals – Change of variables (Cartesian to spherical/cylindrical).

UNIT-IV: Special functions: (8 hrs)

Gamma and Beta Functions – Properties - Relation between Beta and Gamma functions-
Evaluation of improper integrals.

UNIT-V: Vector Differential Calculus (8 hrs)

Scalar and Vector point functions- Vector differentiation - Directional derivatives – Gradient, Curl and Divergence- Vector identities.

UNIT-VI: Vector Integral Calculus (8 hrs)

Vector Integration –Line Integral, Surface Integral, Volume Integral – Green Theorem, Stokes Theorem and Gauss Divergence theorem (without proofs with simple illustrations only).

Suggested Text Books

1. **B.V. Ramana,** Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi, 2014.
2. **Dr.B.S.Grewal,** Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.

Reference Books

3. **Erwin Kreyszig,** Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. **G.B. Thomas and R.L. Finney**, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
5. **Veerarajan T**., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
6. **D. Poole**, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
7. **N.P. Bali and Manish Goyal**, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

ENGINEERING PHYSICS
(Common for ME & CE)

Course Code : 20BST106

L	T	P	C
3	0	0	3

COURSE DESCRIPTION:

This course encompass Fundamental Concepts of Physics that include

- Waves and Oscillations
- Wave Optics
- Lasers
- Fiber Optics
- Introduction to solid state physics
- Materials Science

Those are inevitable for any Engineering student so that these prerequisites aid the student to readily understand Day to Day Engineering Problems with Pragmatic Approach.

COURSE OBJECTIVES

- To Recognize the nature of Oscillation in terms of energy exchange
- To Realize the principles of optics in designing optical devices
- To Comprehend the Principles of Lasers
- To Infer the Principles of Fiber Optics
- To Summarize general principles of crystal and molecular structures
- To Identify Magnetic properties and Superconducting properties

COURSE OUTCOME: Will be able to

- CO1 Resolve the knowledge of Oscillations in terms of energy exchange
- CO2 Apply the principles of optics in designing optical devices
- CO3 Illustrate the Principles of Lasers
- CO4 Outline the Principles of Fiber Optics.
- CO5 Interpret general principles of crystal and molecular structures.
- CO6 Infer Magnetic properties and Superconducting properties

UNIT- I: WAVES & OSCILLATIONS

Damped Oscillations: Harmonic oscillator; Differential Equation of Wave Motion, Damped Harmonic oscillator; Over-Damped, Critically Damped and Under-Damped Oscillations

Forced Oscillations: Resonance and Quality Factor

UNIT- II : Wave Optics

Interference - Introduction, Principle of Superposition of Waves, Interference in Plane Parallel Film due to Reflected Light, Newton's Rings under Reflected Light - Determination of Wavelength of Monochromatic Source of Light.

Diffraction - Introduction, Differences between Interference and Diffraction, Fraunhofer Diffraction due to Single Slit – Intensity Distribution.

UNIT-III : Lasers

Lasers - Introduction, Characteristics of Lasers- Coherence, Directionality, Monochromacity and High Intensity, Principle of Laser – Absorption, Spontaneous and Stimulated Emission, Einstein Coefficients (Qualitative), Population Inversion, Optical Resonator and Lasing Action, Ruby Laser [Three Level System], Helium-Neon Laser [Four Level System], Applications of Lasers in Industry, Scientific and Medical Fields.

UNIT-IV : Fiber Optics

Fiber Optics - Introduction, Optical Fiber Construction, Principle of Optical Fiber – Total Internal Reflection, Conditions for Light to Propagate - Numerical Aperture and Acceptance Angle, Differences between Step Index Fibers and Graded Index Fibers, Differences between Single Mode Fibers and Multimode Fibers, Applications of Optical Fibers in Communication

UNIT-V : Introduction to Solid State Physics

Crystal Structure - Introduction, Basic Terms – Lattice, Basis, Crystal Structure, Coordination Number, Atomic Radius, Packing Fraction, Free Volume, Lattice Parameters, Unit Cell and Primitive Cell, Crystal Systems and Bravais Lattices, Structure and Packing Fractions of Simple Cubic, Body Centered Cubic and Face Centered Cubic Crystal Structures.

UNIT-VI : Materials Science

Magnetic Materials: Types of Magnetic Materials (Dia, Para, Ferro, Ferri&Antiferro), Hysteresis, Weiss Theory of Ferromagnetism, Soft and Hard Magnetic Materials.

Superconductivity: Introduction, Meissner Effect, Type-I & Type-II Superconductors, Applications

Texts

1. A Textbook of Engineering Physics, M N Avadhanulu & P G Kshirsagar, S.Chand Publishers
2. Fundamentals of Physics by Resnick, Halliday and Walker

References

1. University Physics by Young and Freedman
2. Solid State Physics by S. O. Pillai, New Age International Pubishers
3. Engineering Physics, Volume-I&II, P.K.PalaniSwamy, Scitech Publications Hyderabad
4. Engineering Physics Volume I&II Dr.K.Vijaykumar, S.Chand Publishing Company, New Delhi
5. Engineering Physics Dr. S. Mani Naidu, Pearson Publications Chennai

BASIC ELECTRICAL ENGINEERING

Course Code: 20EST101

L	T	P	C
3	0	0	3

Course objectives:

- To introduce the basic knowledge of electric circuits
- To illustrate knowledge with network reduction techniques.
- To analyze AC circuits.
- To provide knowledge on Magnetic circuits.
- To become familiar with DC Generator.
- To understand the concept of DC Motor.

Course outcomes:
CO1: Able to summarize different electrical circuits.
CO2: Able to construct network reduction techniques
CO3: Able to outline the basics of AC circuits.
CO4: Able to state magnetic circuits.
CO5: Able to examine DC Generator.
CO6: Able to explain DC Motor.

UNIT –I Introduction to Electric Circuits
Basic definitions, Electrical circuit elements (R, L and C), Voltage and current sources Independent and dependent sources, Ohm's Law, Series & Parallel circuits, Source transformation, Kirchhoff's Laws, , simple problems.

UNIT-II Network Reduction Techniques
Star-Delta transformation, Nodal Analysis, Super node, Mesh analysis, super mesh-Problems.

UNIT-III AC Circuits
Representation of sinusoidal waveforms, peak and rms values, phasor representation, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series only), real power, reactive power, apparent power, power factor, simple problems.

UNIT-IV Magnetic circuits
Basic definitions of magnetic flux, flux density, Reluctance, Magneto motive force (m.m.f), magnetic field intensity, magnetic permeability and susceptibility. Comparison between magnetic and electrical circuits, inductively coupled circuits, coefficient of coupling, dot convention, simple problems on magnetic circuits.

UNIT-V DC Generator
Generator-Principle of Operation, Construction, EMF equation, Classification, O.C.C, internal and external characteristics of shunt generator, Applications.

UNIT-VI DC Motor
Motor-principle of operation, Torque equation, Classification Speed Control Methods, Operation of 3 point starter, Applications.

TEXT BOOKS

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand& Co.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

REFERENCE BOOKS .

1. Basic Electrical Engineering Dr.K.B.MadhuSahu scitech publications (india) pvt.ltd.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

WORKSHOP AND MANUFACTURING PRACTICE
(Common for all Branches)

Course Code: 20ESL102

L	T	P	C
1	0	4	3

COURSE OBJECTIVES:

- The Engineering Workshop Practice for engineers is a training lab course spread over entire semester. The modules include training on different trades like Fitting, Carpentry, Black smithy etc… which makes the students to learn how various joints are made using wood and other metal pieces.

COURSE OUTCOMES:

On completion of this course, students should be able to:

CO 1. Make half-lap, mortise & tenon, corner dovetail or bridle wooden joints.
CO 2. Develop sheet metal into objects like square tray, taper side tray, conical funnel or elbow pipe.
CO 3. Forge MS rod from round to square cross-section, or into L- or S- bend.
CO 4. Fabricate MS pieces into either a straight, square, dovetail or V-fit.
CO 5. Connect a staircase or a tube light house-wiring electrical circuit.

I. Wood Working Technology - Familiarity with different types of wood and tools used in wood Working technology.

Tasks to be performed:

1) Half – Lap joint 2) Mortise and Tenon joint
3) Corner Dovetail joint 4) Briddle joint.

II. Sheet Metal Working – Familiarity with different types of tools used in sheet metal working, developments of sheet metal jobs from GI sheets, knowledge of basic concepts of soldering.

Tasks to be performed:

1) Square Tray 2) Taper side Tray
3) Conical Funnel 4) Elbow Pipe.

III. Forging Technology – Familiarity with different types of tools used in forging technology. Knowledge of different types of furnaces like coal fired, electrical furnaces etc...

Tasks to be performed:

1) round M.S rod to square bar 2) L bend in given M.S. Rod.
3) S bend in given M.S. Rod. 4) heat treatment tests like annealing, normalizing etc...

IV. Fitting Technology – Familiarity with different types of tools used in fitting technology.

Tasks to be performed:

1) "V" – fitting 2) square fitting
3) Dovetail fitting 4) Straight fitting

V.HOUSE WIRING

1) Tube light connection
2) Staircase connection

Note: Any two jobs from each trade must be performed by the student.

LANGUAGE PROFICIENCY LAB
(CSE / IT / CE / ME)

Course Code: 20HSL101

L	T	P	C
0	0	3	1.5

Course Objectives

- To enable students develop neutralized accent
- To assist students utter words intelligibly
- To enhance the ability of students to speak spontaneously
- To help students converse aptly as the context demands
- To get students acquire perceptive abilities in professional conversations
- To aid students grasp and interpret information provided in graphs and tables

Course Outcomes

- Students will be able to recognize differences among various accents and speak with neutralized accent.
- Students will be able to pronounce words accurately with the knowledge of speech sounds and use appropriate rhythm and intonation patterns in speech.
- Students will be able to speak extemporaneously about anything in general.
- Students will be able to generate dialogues for various situations.
- Students will be able to present posters perceptively and concisely.
- Students will be able to comprehend and interpret data provided in graphs and tables.

Course Syllabus

Unit I: Listening Comprehension of Audio and Video clips of different accents
Unit II: Pronunciation—Intonation—Stress—Rhythm
Unit III: JAM — Narration of an Event
Unit IV: Situational Dialogues
Unit V: Poster Presentation
Unit VI: Interpretation of Data in Graphs and Tables

Suggested Readings:

1. Communication Skills. Sanjay Kumar and Pushpa Lata. OUP. 2011.
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Speak Well. K. Nirupa Rani. Orient Blackswan, Hyderabad. 2012.
4. Strengthen Your Communication Skills. M. Hari Prasad. Maruthi Publications, Hyd. 2014.
5. Strengthen Your Steps. M. Hari Prasad. Maruthi Publications, Hyderabad. 2012.
6. Technical Communication. Meenakshi and Sangeetha. OUP. New Delhi. 2013.

PHYSICS LABORATORY
(Common to All Branches)

Course Code : 20BSL101

L	T	P	C
0	0	3	1.5

Course Description:

This Laboratory course is intended to apply the scientific method to expedite experiments that include

- Error analysis
- Waves Fundamentals
- Mechanics
- Physical Optics
- Lasers and Fiber Optics
- Semiconductor devices

So that student can verify theoretical ideas and concepts covered in lecture through host of analytical techniques, statistical analysis and graphical analysis.

Course Objectives:

- To Operate Sensitive Instruments for precision measurements
- To Identify Error for targeted accuracy
- To Interpret the results of mechanical parameters such as modulus of elasticity and acceleration due to gravity through simple oscillatory experiments using torsional pendulum or physical pendulum
- To Determine relevant parameters associated with Interference and Diffraction phenomena using Travelling Microscope and Spectrometer.
- To Exhibit Techniques and Skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
- To Characterize semiconducting material devices.

Course Outcomes: Will be able to

CO1 Demonstrate the ability for precision measurements to design instrumentation
CO2 Estimate the Error for targeted accuracy
CO3 Infer the results of mechanical parameters such as modulus of elasticity and acceleration due to gravity through simple oscillatory experiments using torsional pendulum or physical pendulum
CO4 Apply the knowledge of Optics to calculate geometrical parameters of thickness of thin object and radius of curvature of a lens
CO5 Illustrate techniques and skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
CO6 Evaluate characteristics of semiconducting material devices

LIST OF EXPERIMENTS

1. Precision Measurements and Instruments
2. Error Analysis and Graph Drawing
3. Determination of Rigidity Modulus of the Material of Wire using Tensional Pendulum
4.

5. Determination of Acceleration due to Gravity (g) using Compound Pendulum
6. Newton's Rings – Determination of the Radius of Curvature of a given Plano Convex Lens
7. Determination of Thickness of Thin Object using Wedge Method
8. Verify the characteristic curve of NTC Thermistor.
9. Determination of width of a single slit using LASER
10. Determination of Numerical Aperture and Bending Loss of an Optical Fiber
11. Determination of Energy Band Gap using the given Semiconductor

Manual / Record Book

1. Manual cum Record for Engineering Physics Lab, by Prof. M. Rama Rao, Acme Learning.

2. Lab Manual of Engineering Physics by Dr.Y. Aparnaand Dr. K. VenkateswaraRao (VGS bookslinks, Vijayawada)

BASIC ELECTRICAL ENGINEERING LAB

Course Code: 20ESL101

L	T	P	C
0	0	3	1.5

Course Objective:

To introduce the student to study different electrical components and to verify the basic laws related to electrical engineering, Speed control of D.C. motor, testing of transformer, electrical wiring system through study, practice, and experiments.

Course Outcomes:

Students will be able to

CO1: Label various types of electrical components.
CO2: Demonstrate various basic electrical laws.
CO3: Demonstrate speed control DC motor & Characteristics of generator.
CO4: Experiment with lamps.
CO5: Examine electrical wiring system

List of Experiments:

1. Study of electrical components.
2. To verify Ohm's law.
3. To verify (a) Kirchhoff's current law (b) Kirchhoff's voltage law.
4. To verify the total resistance of the series and parallel connected circuits.
5. Find armature resistance, field resistance and filament Lamp Resistance using V-I method.
6. Magnetization characteristics of DC shunt generator.
7. Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field flux control method
8. Fluorescent tube connection.
9. (a) One way control of lamp
   (b) Two way control of lamp
10. Fan wiring.

Additional Experiments:

11. Soldering and bread board precautions.
12. To find voltage current relationship for series RL circuit and determine power factor.

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B. Tech. (2nd Sem)	MC	20MCT102	Environmental Science	2	0	0	0.0
	BSC	20BST102	Differential Equations	2	1	0	3.0
	BSC	20BST107	Chemistry	3	0	0	3.0
	PC	20CET101	Surveying and Geomatics	3	0	0	3.0
	ESC	20ESI102	Programming for Problem Solving	3	0	3	4.5
	ESC	20ESL103	Engineering Graphics & Design	1	0	4	3.0
	BSC	20BSL102	Chemistry Lab	0	0	3	1.5
	PC	20CEL101	Surveying Lab – 1	0	0	3	1.5
Total				**14**	**1**	**13**	**19.5**

Environmental Science
(Common to all Branches)

Course Code: 20MCT102

L	T	P	C
2	0	0	0

Course Objectives:

- Memorize the knowledge of environment and status of different resources on earth.
- Identify the significance, arrangement, causes of annihilation and conservation of ecosystems and biodiversity..
- Identify the significance, types and conservation of biodiversity.
- Discriminate causes, effects of a variety of pollutions and suitable control methods.
- Identify the hurdles of sustainable development; evaluate the different environmental management and legal issues.
- Describe the population growths, health problems and evaluate the environmental assets.

Course Outcomes: By Studying this Course Student will

1. Recognize and speaks well again on the general issues of environment and know how to conserve resources for better usage.
2. Explain and demonstrate the ecosystems setup, assess.
3. Recognize and conserving of diversity to upkeep.
4. Examine a range of pollution problems along with control and their eco-friendly disposal methods.
5. Translate the sustainable development practice through clean development mechanisms.
6. Evaluate the changing trends of world population and compile the information in order to document the environmental assets.

Unit – I (*6 lectures*)

Importance of Environmental Studies and Natural Resources: Definition of Environment – Importance - Need for Public Awareness

Forest Resources - Use and over exploitation - deforestation – consequences – case study

Water Resources - Use and over utilization - dams - benefits and problems on Tribes and Environment

Food Resources – Food security concept - changes caused by agriculture and overgrazing -effects of modern agriculture – fertilizer - pesticide problems - water logging - salinity – concept of sustainable agricultural methods - case study

Energy Resources - Non-renewable energy resources – coal – crude oil - natural gas - use of renewable and alternate energy sources

Unit – II (*3 lectures*)

Ecosystems: Definition – Structure of ecosystem: producers - consumers – decomposers. Functions of ecosystem: Food chains - food webs - ecological pyramids - Energy flow – Nutrient cycles (Carbon cycle and Nitrogen cycle). Ecological succession

Unit-III (*3 lectures*)

Biodiversity and its conservation: Definition of Biodiversity - Values of biodiversity - Bio-geographical classification of India - Hot Spots of India - Endangered and endemic species of India –Threats to biodiversity - Conservation of biodiversity

Unit – IV (*6 lectures*)

Environmental Pollution: Definition – causes - effects - control measures of Air pollution -Water pollution - Noise pollution – Marine Pollution - Nuclear hazards.

Solid waste Management: Causes - effects - disposal methods of urban waste – biomedical wastes - case studies

Disaster management: floods – earthquakes – cyclones

Unit – V (*6 lectures*)

Social Issues and the Environment: Concept of Unsustainable and Sustainable development –Water conservation: Rain water harvesting- Watershed management – Global environmental challenges: climate change - global warming – acid rains - ozone layer depletion -World summits on environment: Stockholm conference – Rio-earth summit – Kyoto protocol – Environment (Protection) Act - Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act - Wildlife (Protection) Act - Forest (Conservation) Act

Unit – VI (*4 lectures*)

Human Population and the Environment: Population growth patterns - variation among nations - Population problems - control -Environment and human health - Role of information Technology in Environment and human health

Text Books:

1. Shashi Chawla. 2015, *A Text book of Environmental Studies*, Revised edition, TMH, New Delhi
2. Bharucha, E. 2005, *Text book of Environmental Studies*, First edition, Universities Press (India) Pvt. Ltd., Hyderabad
3. Suresh K. Dhameja. 2006-07, *Environmental Studies*, Third revised edition, S.K. Kataria & Sons (P) Ltd., New Delhi
4. Benny Joseph. 2015, *Environmental Studies*, Revised edition, TMH, New Delhi

Reference Books:

1. Odum, E.P, *Fundamentals of Ecology*, Third edition, W.B. Saunders & Co (P) Ltd., Philadelphia.
2. P. D. Sharma, *Ecology and Environment*, Revised edition, Rastogi Publications (P) Ltd.
3. Cunningham, W.P., Cunningham, M.A., *Principles of Environmental Science*, TMH, New Delhi.
4. Peavy, Rowe and Tchobanoglous, *Environmental Engineering*, Mc Graw – Hill Internationaledition.
5. Graedel, T.E., Allenby, B.R., *Industrial Ecology and Sustainable Engineering*, PearsonPublications.

Differential Equations
(Common to All)

Course Code : 20BST102

L	T	P	C
2	1	0	3

Course Objectives:

- To solve the first order Ordinary Differential equations and apply to Orthogonal trajectories, Newton's Law of Cooling and Law of Growth (Decay).
- To solve second and higher order ordinary differential equations.
- Derive the Fourier series expansion of one variable functions.
- Understand Taylor's, Maclaurin's series expansion and rules of calculating extreme value of two or more variable functions.
- Learn the methods of solving first order quasi-linear (Lagrange) partial differential equations and first order non-linear partial differential equations.
- Understand the method of solving a linear Partial differential equation with constant coefficients by method of Separation of Variables, solve a one dimensional Wave and a one dimensional Heat equation.

Course Outcomes: The student will be able to:

- Apply the mathematical tool for the solution of Ordinary Differential equations, Orthogonal trajectories, Newton's Law of Cooling and Law of Growth (Decay).
- Evaluate higher order homogenous and non-homogenous linear differential equations with constant coefficients.
- Estimate the Fourier series expansion of one variable functions.
- Estimate the Taylor's, Maclaurin's series expansion of two variable functions and extreme values of two or more variable functions.
- Evaluate a first order quasi-linear (Lagrange) partial differential equations and first order non-linear partial differential equations.
- Evaluate a one dimensional Wave and Heat equation.

UNIT-I : Ordinary differential equations of first order: (8 hrs)

Linear type - Bernoulli type–Exact type - Equations reducible to exact type- Orthogonal Trajectories- Newton's law of cooling - Law of Growth and Decay.

UNIT-II: Ordinary differential equations of higher order : (8 hrs)

Higher order homogenous and non-homogenous linear differential equations with constant coefficients- Complimentary Functions-Particular integrals for the functions of type $\sin(ax+b)/\cos(ax+b)$, x^m, e^{ax} , $e^{ax}V(x)$ - Method of variation of parameters, Applications-LCR circuits.

UNIT-III: Fourier Series: (8 hrs)

Fourier Series -Even and odd functions– Fourier series of functions defined in the interval $(0, 2\pi)$, $(-\pi, \pi)$, $(0, 2c)$,$(-c,c)$ - Half range Fourier sine and cosine series

UNIT-IV : Partial Differentiation (8 hrs)

Functions of two or more variables-Partial differentiation-Total Derivative- Taylor's and Maclaurin's Series (without proof) - Maxima, minima of functions without constraints and functions with constraints (Lagrange method of undetermined multipliers).

UNIT-V : Partial Differential Equations of first order (8 hrs)

Partial differential Equations - Formation of partial differential equations– solutions of first order quasi-linear (Lagrange) partial differential equations and first order non-linear (standard type) partial differential equations.

UNIT-VI: Applications of Partial Differential Equations (8 hrs)

Solution of linear Partial differential equations with constant coefficients – Method of Separation of Variables- One dimensional Wave and Heat equations.

Suggested Text Books

1. B.V.Ramana, Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi,2014.
2. Dr.B.S.Grewal, Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

CHEMISTRY
(Common to All Branches)

Course Code: 20BST107

L	T	P	C
3	0	0	3

Course Objectives:

The students will become familiar and understand about:

- Rationalise the importance of water for society and industrial needs.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- To become familiar in moulding methods of preparation of different types of plastic materials
- Rationalise organic reactions such as addition, substitution, elimination, rearrangement reactions.
- Rationalise reference electrodes and science of corrosion.
- Distinguish Renewable & Non-Renewable energy resources and rationalise about green chemistry, batteries.

Course Outcomes:

The course will enable the student to:

- Rationalise the importance of water for society and industrial needs.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Differentiate different moulding techniques of plastic materials
- Rationalise organic reactions such as addition, substitution, elimination, rearrangement reactions.
- Rationalise the science of corrosion.
- Distinguish Renewable & Non-Renewable energy resources and rationalise about green chemistry, batteries.

Unit-1: Water Technology *(9 lectures)*

Hardness of Water – Temporary and Permanent Hardness - Units of Hardness - Estimation of Hardness by EDTA Method - Problems on Temporary and Permanent Hardness - Disadvantages of Hard Water – Softening Methods of Hard Water- Zeolite or Permutit Process - Ion Exchange Process - Methods of Treatment of Water for Domestic Purposes – Sedimentation, Coagulation, Filtration, Disinfection - Sterilization, Chlorination, Break Point chlorination, Ozonisation.

Unit-2: Spectroscopy *(8 lectures)*

Spectroscopy - Electronic Spectroscopy - Types of Electronic Transitions - Definition of Chromophore – Definition of Auxochrome – Absorption and Intensity Shifts - Introduction to I.R. Spectroscopy – Fingerprint Region – Introduction to NMR – Principle - Equivalent and Non-Equivalent Protons - Chemical Shift- Splitting – Coupling Constant.

Unit-3: Polymers and Plastics *(7 lectures)*

Definitions of Polymer, Polymerization – Functionality – Degree of polymerization - Types of Polymerization (Addition and Condensation Polymerizations) - Plastics – Definition, Thermoplastics, Thermosetting Plastics – Compounding of Plastics – Moulding of Plastics into Articles (Compression,

Injection, Transfer and Extrusion Moulding Methods) - Preparation, Properties and Engineering Uses of PVC and Bakelite.

Unit-4: Organic Reactions ***(7 lectures)***

Types of Organic reactions: Addition - Electrophilic, Nucleophilic and Free radical - Substitution - Electrophilic, Nucleophilic (SN^1 and SN^2) and Free radical – Elimination (E_1 and E_2) – Rearrangement Reactions (Claisen, Pinacol Pinacolone Rearrangement).

Unit-5: Corrosion and Its Control ***(9 lectures)***

Definition of Corrosion – Theories of Corrosion (Chemical & Electrochemical) – Mechanism of Electrochemical Corrosion (Oxygen Absorption Type and Hydrogen Evolution Type) - Galvanic Series - Factors Influencing Corrosion – Corrosion Control Methods - Proper Designing, Modifying the Environment, Cathodic Protections – Sacrificial Anodic Protection and Impressed Current Cathodic Protection. Metallic (Anodic and Cathodic) Coatings – Methods of application on metals (Galvanizing and Tinning).

Unit-6: Green Chemistry & Energy ***(8 lectures)***

Introduction to green chemistry – Definition and 12 principles of green chemistry.

Types of energy sources – Renewable & Non-Renewable - Introduction to solar energy – harnessing of solar energy – photo voltaic cells – Concentrated Solar power plants.

Introduction of Energy storage devices: Principle& mechanism of Batteries & Supercapacitors, Types of Batteries (Alkaline & Lead-Acid) - Difference between Batteries and Supercapacitors.

Suggested Text Books:

(i) University chemistry, by B. H. Mahan
(ii) Elementary organic spectroscopy: principles and applications, by Y. R. Sharma
(iii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iv) "Engineering Chemistry", P. C. Jain and Monica Jain, Dhanpat Rai Publications, Co., New Delhi, 2004, 16th Edition

Reference books:

(i) Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(ii) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(iii) Physical Chemistry, by P. W. Atkins
(iv) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.
(v) Concise Inorganic Chemistry: Fifth Edition by J.D. Lee

Surveying and Geomatics

Course Code:20CET101

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To measure the land area by plane table and chaining.
- To explain the conventional methods of surveying
- To apply the concept of leveling to prepare the contour maps
- To apply the concept of tachometer in angular measurement, elevation and distance between an object
- To determine the relief and tilt displacements from the aerial photographs
- To demonstrate the working principle of remote sensing

COURSE OUTCOMES:

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

- Measure the land area by plane table and chaining.
- Explain the conventional methods of surveying
- Apply the concept of leveling to prepare the contour maps
- Apply the concept of tachometer in angular measurement, elevation and distance between an object
- Determine the relief and tilt displacements from the aerial photographs
- **Demonstrate the working principle of remote sensing**

UNIT I

Introduction: Surveying definition & objectives, plane surveying principles and classification, scales, Errors and Mistakes.

Chain Surveying: Principles, Equipment, Working from whole to part, Types of tapes and chains, selection of stations, offsets, Tape Variations, Errors and Corrections

UNIT II

Compass Surveying: Types of compass, Measurement of directions and angles, types of compass, meridians and bearings, local attraction, magnetic declination, traversing, plotting of traverse, adjustment of closing error.

UNIT III

Levelling and Contouring: Description of a point (position) on the earth's surface, instruments for leveling, principle and classification of leveling, bench marks, leveling staff, readings and booking of levels, field work, longitudinal section and cross section, plotting the profile, height (level) computations, contours, characteristics of contours, methods of contouring, interpolation, contour gradient, contour maps.

UNIT IV

Theodolite and Tacheometric Surveying: Principle of theodolite survey, Theodolite component parts, observations, Traversing, traverse computations, Trigonometrical Surveying, Tacheometry, principle of tacheometry, methods of tacheometry, tacheometry as applied to subtense measurement, fundamentals of total station and GPS.

Curves: Types of curves, design and setting out – simple and compound curves.

UNIT V

Photogrammetry Surveying : Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy.

UNIT VI

Remote Sensing and GIS: Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation. Introduction to GIS.

TEXT BOOKS:

1. Duggal S K, "Surveying (Vol – 1, 2 & 3), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2017.
2. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Surveying I & II, Laxmi Publications, 17th edition, 2016.
3 Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
4. Anji Reddy M., Remote sensing and Geographical information system, B.S. Publications, 2001.
5. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi, 2nd edition, 2014.

REFERENCES:

1. Chandra A. M., Plane Surveying, New Age International Publ., 2007.
2. Geomatics Engineering by Manoj, K. Arora and Badjatia, Nem Chand & Bros, 2011

Programming for Problem Solving
(Common to all Branches)

Course Code: 20ESI102

L	T	P	C
3	0	3	4.5

Course Objective

The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Course Outcomes

Co1 Understand the fundamentals of C programming
Co2 Choose the loops and decision making statements to solve the problem
Co3 Make use of pointers to access arrays, strings and implements different operations on arrays, and work with textual information, characters and strings.
Co4 Apply programming to write modular programs, user defined functions to solve real time problems and allocate memory using dynamic memory management functions.
Co5 Create user defined data types including structures and unions to solve problems.
Co6 Implement files operations in C programming for a given application and able to handle errors during program execution.

UNIT: 1

Introduction to Programming

Introduction to components of Computer system, Algorithm, Flow chart, Program development steps, C Tokens, Operator precedence, Structure of C program, Basic I/O statements.

Exercise Questions: 1

Ex 1: Write the C programs to calculate the following
a) Area of triangle when sides are given.
b) Program for Type Casting.
c) Interchanging values of two variables.

Ex 2: Write the C programs to perform the following
a) Read lower case character and convert into upper case.
b) Find maximum of 3 values using conditional operator.
c) Calculate area and perimeter of circle.

UNIT: 2

Control Structures

Decision statements: if, if-else, nested if and switch, **Iterative statements:** for, while, do while and nested loops **Branching:** Break, continue, goto.

Exercise Questions: 2

Ex 3: Write C programs for the following using decision making statements

a) Program to find roots of quadratic equation.
b) Find the Largest among 3 values.
c) Calculate the grades of a student.

Ex 4: Write C programs for the following using Iterative Statements

a) Arithmetical operations using switch-case.
b) Read a number and display in reverse.
c) Check for Armstrong number property

Ex 5:

a) Generate Fibonacci series.
b) Generate Prime numbers between two numbers.
c) Write a program in C to display the pattern like right angle triangle using an asterisk

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UNIT: 3

Arrays: Definition, Types: 1D, Multi Dimensional arrays, declaration, initialization, accessing elements, Matrix operations and String Handling.

Pointers: Definition, Declaration, Initialization, Pointer arithmetic, Pointer to pointer, arrays and pointers, Dynamic memory allocation

Exercise Questions: 3

Ex 6: Implement the following using arrays

a) Largest and smallest from a list of elements.
b) Program for Linear Search.
c) Program for Bubble Sort.

Ex 7: Implement the following using arrays

a) Matrix addition.
b) Matrix Multiplication.
c) Program using string handling functions

Ex 8: Implement the following using DMA Functions

a) Find the sum and average of list of elements using DMA Functions
b) Implementation of call by reference and call by valve.

Ex 9:

a) Implement C Program using any numerical methods

UNIT: 4

Functions: Definitions, Declaration, Types of Functions, Parameter passing, Passing Arrays to functions, Recursion, library functions, functions and pointers, and Storage classes,

Exercise Questions: 4

Ex 10:

a) Factorial using recursion and non recursion.
b) GCD using recursion and non recursion.
c) To count the digits of a given number using recursion

UNIT: 5

Structures: Definition, Declaration, Accessing the structure elements, Array of structures, Arrays with in structures, pointer to structure, passing structure to function, nested structures, and unions.

Exercise Questions: 5

Ex: 11

a) Implementation of array of structure
b) Demonstration of Union

UNIT: 6

Files: Definition, Types of files, Opening modes, File IO Functions, Random access functions, Preprocessor directives.

Exercise Questions: 6

Ex 12:

a) Copy the contents of one file into another.
b) Count the number of characters, words and lines in a file.

Text Books

1. "The C – Programming Language", B. W Kernighan, Dennis M. Ritchie, 2nd Edition, PHI.
2. **"**A Structured Approach Using C" by Behrouz A. Forouzan, Richard F. Gilberg 3rd Edition
3. "Problem solving Through 'C'- User Friendly Approach", Dr. G.S.N Murty, S Vishnu Murty, First Edition, MANTECH Publications Pvt.Ltd., 2020

References

1. "Let Us C", Yashwant Kantikar, 8th Ed., PBP Publications 2012.
2. "C Programming", E. Balagurusamy, Tata Mc Graw Hills,2011,New Delhi, India.

Web Links

1. https://www.tutorialspoint.com › Cprogramming › C – Home
2. https://www.programiz.com/c-programming

ENGINEERING GRAPHICS & DESIGN

Course Code: 20ESL103

L	T	P	C
1	0	4	3

COURSE OBJECTIVES:

- Able to develop drawing skills.
- To draw orthographic views from the given isometric view and vice verse
- To understand the fundamentals of computer aided design and drafting

COURSE OUTCOMES:

CO 1. Draw projection of points and straight lines in first angle projection.
CO 2. Project plane surfaces and simple solids inclined to one reference plane.
CO 3. Convert orthographic views into isometric projections and vice-versa.
CO 4. Draw basic lines and profiles with commonly used operations in drafting software.
CO 5. Generate 2D drawings along with dimensioning in drafting software.

LIST OF EXERCISES:

PART-A: Conventional Engineering drawing

1 Projections of points
2 Projections of straight lines inclined to one reference plane only.
3 Projections of planes inclined to one reference plane only.
4 Projections of simple solids inclined to one reference plane only.
5 Conversion of isometric views into orthographic views
6 Conversion of orthographic views into isometric views.

PART-B: Basic Computer aided engineering drawing (2-D drawings)

1. Commands – Axes, Coordinate points, Creation of lines, Polylines, Square, Rectangle, Polygons, Spines, Circles, Ellipse, Text.
2. Move, Copy, Offset, Mirror, Rotate, Trim, Extend, Break, Chamfer, Fillet, Curves.

Note: Six Exercises are to be completed by using AutoCAD software

TEXT BOOKS:

1. Engineering Drawing, N. D. Bhatt, V. M. Panchal, Charotar Pub.
2. Engineering Drawing, K. L .Narayana, P.Kanniah, Scitech Pub.

REFERENCE BOOKS:

1. Engineering Drawing and Graphics, 2nd ed., K. Venugopal, New Age International Pub.
2. Fundamentals of Engineering Drawing, 11th ed., Luzadder, J. Warren, D.M. Jon, Prentice Hall India Pub.

CHEMISTRY LAB
(Common to All Branches)

Course Code: 20BSL102

L	T	P	C
0	0	3	1.5

Course Objectives:

***The students will become familiar and understand about*:**

- Measure molecular/system properties such as kinematic viscosity, acid number of lubricating oil, etc
- Measure molecular/system properties such as surface tension and viscosity.
- Measure molecular/system properties such as pH, conductance of solutions, redox potentials, etc
- Measure molecular/system properties such as chloride content, hardness of water, dissolved oxygen, etc.
- Synthesize a small polymer molecule and analyze a salt sample.
- Estimate iron (by colurimeter), partition coefficient, and adsorption of acetic acid by charcoal etc.

Course Outcomes:

***The students will learn to*:**

- Measure molecular/system properties such as kinematic viscosity, acid number of lubricating oil, etc.
- Measure molecular/system properties such as surface tension and viscosity.
- Measure molecular/system properties such as pH, conductance of solutions, redox potentials, etc
- Measure molecular/system properties such as chloride content, hardness of water, dissolved oxygen, etc.
- Synthesize a small polymer molecule and analyze a salt sample.
- Estimate iron (by colurimeter), partition coefficient, and adsorption of acetic acid by charcoal, etc.

LIST OF EXPERIMENTS: Choice of 10-12 experiments from the following:

1. Determination of surface tension and viscosity
2. Determination of Hardness of water sample by EDTA Method.
3. Conductometric estimation of Acid by Base.
4. Conductometric estimation of mixture of acids by base.
5. Potentiometric Titrations.
6. Synthesis of a polymer/drug.
7. Determination of acid value of an oil
8. Chemical analysis of a salt
9. Determination of Dissolved Oxygen present in the given water sample by Modern Winkler's Method
10. Colurimetric estimation of iron
11. pH metric titrations
12. Determination of the partition coefficient of a substance between two immiscible liquids
13. Adsorption of acetic acid by charcoal Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg
14. Potentiometric Titration of a Chloride-Iodide Mixture.
15. Determination of Chloride content present in given water sample.
16. Determination of kinematic viscosity of given lubricating oil.

TEXT BOOKS:

1. "Practical Engineering Chemistry" by K.Mukkanti, etal. B.S.Publications, Hyderabad (2011).
2. "Lab Manual on Engineering Chemistry" by Sudharani, Dhanpat Rai Publications, Co., New Delhi., (2009).

REFERENCE BOOKS:

1. "Engineering Chemistry Lab Manual" by Shuchi Tiwari (2010), SCITECH Publications.
2. "Vogel's Text Book of Quantitative Chemical Analysis", 6th Edition by G. J. Jeffery, J. Bassett, J. Mendham, R.C. Denney, Longman Scientific & Technical Publications, New York.
3. "A Text Book of Engineering Chemistry" by R. N. Goyal and H. Goel, Ane Books (P) Ltd.(2009).
4. "A Text Book on experiments and calculations Engineering" by S.S. Dara, S.Chand & Company Ltd. (2003).
5. "Instrumental methods of Chemical Analysis", Gurudeep R, Chatwal Sham, K. Anand, Latest Edition (2015), Himalaya Publications.

Surveying lab-I

Course Code: 20CEL101

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

The Students will have

- Measure survey of an area by chain survey and plotting to do chaining across obstacles,
- Prepare residential building by perpendicular offset, introduction of tie lines
- Do temporary adjustments of prismatic compass
- Find distance between two inaccessible points with compass, a given area by prismatic compass.
- Practice radiation method, intersection methods, setting out simple curve
- Practice Fly leveling, check leveling, contouring

COURSE OUTCOMES:

On completion of the course, the students will get ability to:

- Determine area, chaining across obstacles and prepare outline of residential building using chain survey
- Determine distance between two inaccessible points and area of closed traverse by using prismatic compass
- Compute the measurement of horizontal and vertical angle by Theodolite
- Determine reduced levels for L.S and C.S of road profiles using dumpy or auto level
- Draw contouring by taking R.Ls using leveling instrument

EXCERCISES:

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. a) Measurement of horizontal and vertical angle by Theodolite
   b) Distance between inaccessible points by Theodolite
6. Setting out of simple curve.
7. Introduction to leveling instrument, leveling staff. Reading of level staff, temporary adjustments of leveling instrument.
8. Fly leveling (differential leveling)
9. Check leveling - L.S. & C.S. of a road profile.
10. One exercise on contouring.