ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2020-21)
CIVIL ENGINEERING (CE)

INDUCTION PROGRAM (3 weeks duration)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

Semester I (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Schemeof Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Basic Science course	20ABS9901	Algebra and Calculus	3	0	0	3	30	70	100
2	Basic Science course	20ABS9905	Engineering Chemistry	3	0	0	3	30	70	100
3	Humanities and Social science	20AHS9901	Communicative English	3	0	0	3	30	70	100
4	*Engineering Science Courses	20AES0304	Engineering Workshop Practice	1	0	4	3	30	70	100
5	Engineering Science Courses	20AES0501	Problem Solving and Programming	3	0	0	3	30	70	100
6	Humanities and Social science LAB	20AHS9902	Communicative English Lab	0	0	3	1.5	30	70	100
7	Basic Science course (LAB)	20ABS9910	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
8	Engineering Science Courses (LAB)	20AES0503	Problem Solving and Programming Lab	0	0	3	1.5	30	70	100
Total credits							**19.5**	**240**	**560**	**800**

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Semester II (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Schemeof Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Basic Science courses	20ABS9906	Differential Equations and Vector Calculus	3	0	0	3	30	70	100
2	Basic Science courses	20ABS9903	Engineering Physics	3	0	0	3	30	70	100
3	Engineering Science Courses	20AES0202	Basics of Electrical and Electronics Engineering	3	0	0	3	30	70	100
4	Engineering Science Courses	20AES0509	Basics of Python Programming	3	0	0	3	30	70	100
5	Engineering Science Courses	20AES0301	Engineering Graphics	1	0	4	3	30	70	100
6	Engineering Science Courses (LAB)	20AES0204	Basics of Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
7	Basic Science course (LAB)	20ABS9908	Engineering Physics Lab	0	0	3	1.5	30	70	100
8	Engineering Science Courses (LAB)	20AES0510	Basics of Python Programming Lab	0	0	3	1.5	30	70	100
9	Mandatory course (AICTE suggested)	20AMC9902	Constitution of India	2	0	0	0	30	-	30
Total credits							**19.5**	**270**	**560**	**830**

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Semester III (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Schemeof Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Basic Science courses	20ABS9913	Probability & Statistics, Partial differential equations	3	0	0	3	30	70	100
2	Professional core course	20APC0101	Mechanics of Materials	3	0	0	3	30	70	100
3	Professional core course	20APC0102	Surveying	3	0	0	3	30	70	100
4	Professional core course	20APC0103	Fluid Mechanics	3	0	0	3	30	70	100
5	Humanities and social science	20AHSMB01	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
6	Professional core courses (LAB)	20APC0104	Strength of Materials Lab	0	0	3	1.5	30	70	100
7	Professional core courses (LAB)	20APC0105	Surveying Lab	0	0	3	1.5	30	70	100
8	Professional core courses (LAB)	20APC0106	Fluid Mechanics Lab	0	0	3	1.5	30	70	100
9	**Skill Oriented Course***	20APC0107	Basics of CAD	1	0	2	2	100	-	100
10	Mandatory course (AICTE suggested)	20AMC9903	Environmental Studies	2	0	0	0	30	-	30
Total credits							**21.5**	**370**	**560**	**930**

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Semester IV (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Schemeof Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Basic Science courses	20ABS9922	Mathematical Modelling and optimization techniques	3	0	0	3	30	70	100
2	Professional core course	20APC0108	Strength of Materials	3	0	0	3	30	70	100
3	Professional core course	20APC0109	Hydraulic Engineering	3	0	0	3	30	70	100
4	Professional core course	20APC0110	Structural Analysis-I	3	0	0	3	30	70	100
5	Professional core course	20APC0111	Concrete Technology	3	0	0	3	30	70	100
6	Humanity Science Courses	20AHS9905	Universal Human Values	3	1	0	3	30	70	100
7	Professional core courses (LAB)	20APC0112	Hydraulic Machinery Lab	0	0	3	1.5	30	70	100
8	Professional core courses (LAB)	20APC0113	Concrete Technology Lab	0	0	3	1.5	30	70	100
9	Professional core courses (LAB)	20APC0114	Computer-aided Civil Engineering Drawing Lab	0	0	3	1.5	30	70	100
10	**Skill Oriented Course***	20APC0115	Land survey with 2D drafting /Soft skills	1	0	2	2	100	-	100
Total credits							**24.5**	**370**	**630**	**1000**
Internship (Mandatory) 2 Months during summer vacation										
Honors/ Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4**	**30**	**70**	**100**

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Semester V (third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Schemeof Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Professional core course		Environmental Engineering	3	0	0	3	30	70	100
2	Professional core course		Soil Mechanics	3	0	0	3	30	70	100
3	Professional core course		Design of Reinforced Concrete Structures	3	0	0	3	30	70	100
4	Open Elective course / Job Oriented Elective		Sensor Networks Operations Research Optimization Techniques	3	0	0	3	30	70	100
5	Professional Elective courses		Structural Analysis-II Water Harvesting and Conservation Engineering Geology	3	0	0	3	30	70	100
6	Professional core courses (LAB)		Soil Mechanics Lab	0	0	3	1.5	30	70	100
7	Professional core courses (LAB)		Environmental Engineering Lab	0	0	3	1.5	30	70	100
8	**Skill Oriented Course***			1	0	2	2	100	-	100
9	Mandatory course (AICTE suggested)		Professional Ethics and Human Values	2	0	0	0	30	-	30
	Summer Internship 2 months (Mandatory) after second Year (to be evaluated during V semester			0	0	0	1.5	50	-	50
	Total credits						**21.5**	**390**	**490**	**880**
	Honors/ Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			**4**	**0**	**0**	**4**	**30**	**70**	**100**

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Semester VI (third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Schemeof Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Professional core course		Transportation Engineering-I	3	0	0	3	30	70	100
2	Professional core course		Water Resources Engineering-I	3	0	0	3	30	70	100
3	Professional core course		Foundation Engineering	3	0	0	3	30	70	100
4	Open Elective course / Job Oriented Elective		Introduction to Java Entrepreneurship Management Science	3	0	0	3	30	70	100
5	Professional Elective courses		Design and Drawing of Steel Structures Repairs and Rehabilitation of Structures Remote Sensing and GIS	3	0	0	3	30	70	100
6	Professional core courses (LAB)		STAAD Lab	0	0	3	1.5	30	70	100
7	Professional core courses (LAB)		Remote Sensing and GIS Lab	0	0	3	1.5	30	70	100
8	Professional core courses (LAB)		Transportation Engineering Lab	0	0	3	1.5	30	70	100
9	**Skill Oriented Course***			1	0	2	2	100	-	100
10	Mandatory course (AICTE suggested)	20AMC9901	Biology for Engineers	2	0	0	0	30	-	30
	Total credits						**21.5**	**370**	**560**	**930**
	Honors/ Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			**4**	**0**	**0**	**4**	**30**	**70**	**100**
	Industrial/ Research Internship (Mandatory) 2 Months during summer vacation									

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Semester VII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Schemeof Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Professional Elective courses		Transportation Engineering-II Environmental Impact Assessment Engineering Materials for Sustainability	3	0	0	3	30	70	100
2	Professional Elective courses		Water Resources Engineering-II Advanced Structural Design Civil Infrastructure for Smart City Development	3	0	0	3	30	70	100
3	Professional Elective courses		Estimation Costing & Valuation Structural Health Monitoring Elements of Earth Quake Engineering	3	0	0	3	30	70	100
4	Open Elective course / Job Oriented Elective		Mobile App Development Internet of Things Intellectual Property Rights	3	0	0	3	30	70	100
5	Professional Elective courses		Pre-stressed Concrete Ground Improvement Techniques Intelligent transportation systems	3	0	0	3	30	70	100
6	**Humanities & Social Science Elective***		Universal Human Values Understanding Harmony	3	0	0	3	30	70	100
7	**Skill Advanced Course***			1	0	2	2	100	-	100
	Industrial/ Research Internship 2 months (Mandatory) after Third Year (to be evaluated during VII semester			0	0	0	3	100	-	100
	Total credits						**23**	**380**	**420**	**800**
	Honors/ Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			**4**	**0**	**0**	**4**	**30**	**70**	**100**

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Semester VIII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Schemeof Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Major Project	PROJ	Project Work, Seminar & Internship in Industry	0	0	0	12	60	140	200
	Internship (6 Months)									
	Total credits						12	60	140	200

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Year : I B.Tech **Semester** : I

Subject Code:20ABS9901	Subject Name: **Algebra and Calculus**	L T P 3 0 0	Credits:3

Course Outcomes:

1.Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
2.Utilize mean value theorems to real life problems.
3.Familiarize with functions of several variables which is useful in optimization.
4.Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
5.Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

Unit I : Matrix Operations and Solving Systems of Linear Equations 12 hrs
Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem,

Unit II : Quadratic Forms and Mean Value Theorems 9 hrs
Diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.
Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof);

Unit III: Multivariable calculus 9 hrs
Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Unit IV: Multiple Integrals 10hrs
Double integrals, change of order of integration, double integration in polar coordinates, change of Variables in double integration (Cartesian to polar), areas enclosed by plane curves. Evaluation of triple integrals.

Unit V: Special Functions 10 hrs
Beta and Gamma functions and their properties, relation between beta and gamma functions, Bessel functions, Bessel's equation, Recurrence formulae or $J_n(x)$, Generating function- Orthoganality of Bessels functions.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

References:

1. Dr.T.K.V Iyengar, B.Krishna Gandhi, S. Ranganatham amd M.V.S.S.N Prasad, Mathematics – 1, S.Chand publications.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. B.V.Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
4. N.Bali, M.Goyal, C.Watkins, Advanced Engineering Mathematics, Infinity Science Press.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Apply the knowledge of mathematics	1.1	1.1.1
CO2	PO1:Apply the knowledge of mathematics	1.1	1.1.1
CO3	PO1: Apply the knowledge of mathematics	1.1	1.1.1
CO4	Po2 : analyse complex engineering problems	2.1	2.1.3
CO5	Po2 : analyse complex engineering problems	2.1	2.1.3

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Year: I **Semester**: I

Subject Code	Subject Name	L T P	Credits:3
20ABS9905	**Engineering chemistry**	3 0 0	

Course Outcomes:

1. Understand the disadvantages of using hard water and Select suitable treatments domestically and industrially
2. Understand the electrochemical sources of energy
3. Understand the corrosion prevention methods and factors affecting corrosion
4. Understand the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers.
5. Understand calorific values, octane number, refining of petroleum and cracking of oils
6. Understand the manufacturing of portland cement and concrete formation
7. Summarize the application of SEM, TEM and XRD in surface characterization

Unit 1: Water Technology

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - scale and sludge, Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

Unit 2: Electrochemistry and Applications:
Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells – Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.
Secondary cells – lead acid, nickel-metal hydride and lithium ion batteries- working of the batteries including cell reactions.
Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, environmental factors (pH, temperature, DO) affecting corrosion rate, protection – corrosion inhibitors with specific examples, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Unit 3: Polymers and Fuel Chemistry:
Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.
Thermoplastics and Thermo-sets, Elastomers – applications with specific examples.
Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.
Fuels **–** Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, refining of petroleum, liquid fuels, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio fuels.

Unit 4: Cement and Concrete Chemistry:
Introduction to building materials – Portland cement, constituents, manufacturing process-raw materials for manufacturing process, reactions below 1300 ^{o}C and reactions between 1300 and 1450 ^{o}C, reactions during cooling, grinding or storage, chemical equations, phases of cement clinker (alite, belite, aluminate and ferrite), reactivity of clinker phases, parameters to characterize the clinker formation: lime saturation factor (LSF), silica ratio (SR) and alumina ration (AR), chemistry of setting and hardening of cement (hydration, hydrolysis, equations), scheme of concrete formation, admixtures for concrete improvement – retarders, accelerators, air-entraining agents, grinding agents, super plasticizers, dispersants, etc.

Unit 5: Surface Chemistry and Applications:

Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids,characterization of surface by physicochemical methods (SEM, TEM, XRD), adsorption isotherm, BET equation (no derivation), applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman,1992.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO :1	PO 1:Apply the knowledge of Basic science	1.2	1.2.1
CO :2	PO 1:Apply the knowledge of Basic science	1.4	1.4.1
CO :3	PO 1:Apply the knowledge of Basic science	1.2	1.2.1
CO :4	PO 1:Apply the knowledge of Basic science	1.2	1.2.1
CO :5	PO 2:Analyze complex engineering problems natural sciences	2.4	2.4.4
CO :6	PO 1:Apply the knowledge of Basic science	1.4	1.4.1 .
CO :7	PO 2:Analyze complex engineering problems natural sciences	2.4	2.4.4

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I-Year **Semester** : I

Subject Code: **20AHS9901**	Subject Name: **Communicative English**	L T P 3 0 0	Credits:3

CourseOutcomes:

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

1. Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. Formulate sentences using proper grammatical structures and correct word forms
3. Speak clearly on a specific topic using suitable discourse markers in informal discussions
4. Write summaries based on global comprehension of reading/listening texts
5. Produce a coherent paragraph interpreting a figure/graph/chart/table
6. Take notes while listening to a talk/lecture to answer questions

Unit 1 : EXPLORATION

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading: A Proposal to Girdle the Earth, Nellie Bly -** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing:** Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and un countable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Unit 2: ON CAMPUS

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks.

Reading: The District School As It Was by One who Went to it, Warren Burton - Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices -linkers, sign posts and transition signals; use of articles and zeroarticle;prepositions.

Unit 3: THE FUTURE OF WORK

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: The Future of Work - Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Grammar and Vocabulary: Verbs -tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Unit 4: FABRIC OF CHANGE

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: H.G.Wells and the Uncertainties of Progress, Peter J.Bowler - Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicate processes or display complicated data.

Writing: Information transfer; describe, compare, contrast, identify significance / trends based on information provided in figures/charts/graphs/tables.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms.

Unit 5: TOOLS FOR LIFE

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Leaves from the Mental Portfolio of a Eurasian, Sui Sin Far - Reading for comprehension.

Writing: Writing structured essays on specific topics using suitable claims and evidences.

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject- verb agreement)
Suggested books:

Text Book: English all round: Communication Skills for Under graduation Learners Vol. I, Orient BlackSwan Publisers, First Edition 2019.

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge,2014.
   Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley,ELT; 2nd Edition, 2018.
2. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
3. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

Sample Web Resources

Grammar/Listening/Writing1-language.com,http://www.5minuteenglish.com/, https://www.englishpractice.com/, Grammar/Vocabulary, English Language Learning Online http://www.bbc.co.uk/learningenglish/, http://www.better-english.com/, http://www.nonstopenglish.com/, https://www.vocabulary.com/, BBC Vocabulary GamesFree Rice Vocabulary GameReadinghttps://www.usingenglish.com/comprehension/, https://www.englishclub.com/reading/short-stories.htm, https://www.english-online.at/

Listening

https://learningenglish.voanews.com/z/3613, http://www.englishmedialab.com/listening.html

Speaking

https://www.talkenglish.com/, BBC Learning English – Pronunciation tips, Merriam-Webster – Perfect pronunciation Exercises

All Skills

https://www.englishclub.com/, http://www.world-english.org/, http://learnenglish.britishcouncil.org/
Online Dictionaries, Cambridge dictionary online, MacMillan dictionary, Oxford learner's dictionaries

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List of COs	PO no. and keyword	Competency Indicator: Description	Performance Indicator: Description
CO1.	PO6 Apply contextual knowledge to assess societal, health, safety, legal, and cultural issues.	6.1	6.1.1
CO2.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1	10.1.1
CO3.	PO9-Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9.2	9.2.1
CO4.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1 .	10.1.1
CO5	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1
CO6.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.1

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Year: I **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20AES0304	**Engineering Workshop Practice**	1	0	4	3

Course Outcomes:

CO: 1 Apply wood working skills in real world applications.
CO: 2 Build different parts with metal sheets in real world applications.
CO: 3 Apply fitting operations in various applications.
CO: 4 Apply different types of basic electric circuit connections.
CO: 5 Demonstrate soldering and brazing.

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints
Half – Lap joint
Mortise and Tenon joint
Corner Dovetail joint or Bridle joint

Sheet Metal Working:
Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets
a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

Fitting:
Study the difference types of fits and tolerances, surface finishing materials.
Familiarity with different types of tools used in fitting and do the following fitting exercises
a) V-fit b) Dovetail fit
c) Semi-circular fit d) Bicycle tyre puncture and change of two wheeler tyre

Electrical Wiring:

Study the different types of circuits and connections,
Familiarities with different types of basic electrical circuits and make the following connections
a) Parallel and series b) Two-way switch c) Godown lighting
d) Tube light e) Three phase motor f) Soldering of wires

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Engineering knowledge	1.3	1.3.1
CO: 2	PO 3: Design/Development of Solutions	3.2	3.2.1
CO: 3	PO 1: Engineering knowledge	1.3	1.3.1
CO: 4	PO 3: Design/Development of Solutions	3.2	3.2.2
CO: 5	PO 2: Problem analysis	2.3	2.3.2

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Year : I **Semester : I** **Branch of Study : Common to All**

Subject Code	Subject Name	L	T	P	Credits
20AES0501	Problem Solving and Programming	3	0	0	3

Course Objectives:
1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non-computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language
6. Illustrate the methodology for solving Computational problems

Unit 1:
Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.
Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Unit 2:
Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, the analysis of algorithms.
Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

Unit 3:
Types, Operators, and Expressions: Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.
Input and output: standard input and output, formatted output-Printf, formatted input-Scanf.
Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do- while, break and continue, Goto and labels.
Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

Unit 4:
Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.
Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.
Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k^{th} smallest element

Unit 5:

Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.

Text Books:

1. Pradip Dey, and Manas Ghosh, –Programming in C‖, 2018, Oxford University Press.
2. R.G. Dromey, ―How to Solve it by Computer‖. 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, –The C Programming Language‖, 2nd Edition, Pearson.

Reference Books:

1. RS Bichkar ―Programming with C‖, 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, –Information Technology in Theory‖, 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, –Programming with C‖, 4th Edition, 2019, McGraw Hill Education.

Course Outcomes:

1. Construct his own computer using parts.
2. Recognize the importance of programming language independent constructs
3. Solve computational problems
4. Select the features of C language appropriate for solving a problem
5. Design computer programs for real world problems
6. Organize the data which is more appropriated for solving a problem

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering Knowledge	1.3	1.3.1
CO2	PO2: Problem analysis	2.1	2.1.1
CO3	PO2: Problem analysis	2..2	2.2.2
CO4	PO2: Problem analysis	2.1	2.1.1
CO5	PO2: Problem analysis	2.3	2.3.1
CO6	PO2: Problem analysis	2.2	2.2.3

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I-Year **Semester:** I

Subject Code: 20AHS9902	Subject Name: **Communicative English Lab**	L T P 0 0 3	Credits:1.5

Course Outcomes

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
2. Apply communication skills through various language learning activities
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Syllabus

Unit 1
1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Unit 2
1. JAM
2. Group Discussions
3. Oral Presentations – Power Point Presentations and Poster Presentations

Unit 3
1. Situational dialogues – Greeting and Introduction
2. Formal letter writing and e-mail writing

Unit 4
1. Asking for Information and Giving Directions
2. CV/Resume writing – Cover letter

Unit 5
1. Vocabulary Building
2. Debates

Software Source:

K-Van Solutions Software

Reference:

Teaching English - British Council

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List of COs	PO No. and keyword	Competency Indicator: Description	Performance Indicator: Description
CO1	PO10: Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.1.1
CO2	PO10: Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1
CO3	PO10: Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.1
CO4	PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9.2	9.2.1
CO5	PO10: Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.1

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Year: I **Semester**: I

Subject Code 20ABS9910	Subject Name Engineering Chemistry Lab	L T P 0 0 3	Credits:1.5

Course Outcomes:

1. To familiarize the students with the basic concepts of chemistry of materials
2. Prepare advanced polymer materials
3. Measure the strength of an acid present in secondary batteries
4. To familiarize with digital and instrumental methods of analysis

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method)
3. Determination of pH metric titration of (i) strong acid vs. strong base,
4. Conductometric titrations of (i) strong acid vs. strong base (ii) Weak acid Vs Strong base
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of phenol-formaldehyde resin
7. Preparation of TIO_2/ZnO nano particles.
8. Estimation of Calcium in port land Cement
9. Adsorption of acetic acid by charcoal
10. Thin layer chromatography
11. Determination of Viscosity of lubricating oils by Red Viscometer 1 &2
12. Determination of Copper by Iodometry

List of COs	**PO no. and keyword**	**Competency Indicator**	**Performance Indicator**
CO:1	PO 4: Analysis and interpretation of data	4.3	4.3.3
CO:2	PO 4: Analysis and interpretation of data	4.3	4.3.1
CO:3	PO 4: Analysis and interpretation of data	4.3	4.3.1
CO:4	PO 4: Analysis and interpretation of data	4.3	4.3.2

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Year: I **Semester : I** **Branch of Study : Common to all**

Subject Code	Subject Name	L	T	P	Credits
20AES0503	Problem Solving and Programming Lab	0	0	3	1.5

Course outcomes:

1. Construct a Computer given its parts
2. Select the right control structure for solving the problem
3. Analyze different sorting algorithms
4. Design solutions for computational problems
5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

Laboratory Experiments #

1. Assemble and disassemble parts of a Computer
2. Design a C program which reverses the number
3. Design a C program which finds the second maximum number among the given list of numbers.
4. Construct a program which finds the kth smallest number among the given list of numbers.
5. Design an algorithm and implement using C language the following exchanges a ← b ← c ← d ← a
6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.
7. Implement the C program which computes the sum of the first n terms of the series Sum = 1 – 3 + 5 - 7 + 9
8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.
9. Design an algorithm and implement using a C program which finds the sum of the infinite series $1 – x^2/2! + x^4/4! – x^6/6! + ...$
10. Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.
11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
12. Develop an algorithm which computes the all the factors between 1and100 for a given number and implement it using C.
13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
14. Design a C program which reverses the elements of the array.
15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The starts for each number should be printed horizontally.
16. Implement the sorting algorithms a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort.
17. Illustrate the use of auto, static, register and external variables.
18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.
19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.
20. Design a C program which sorts the strings using array of pointers.

Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.

References:

1. B. Govindarajulu, ―IBM PC and Clones Hardware Trouble shooting and Maintenance‖, Tata McGraw-Hill, 2nd edition, 2002.
2. R.G. Dromey, ―How to Solve it by Computer‖. 2014, Pearson.

List of Cos	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2: Problem analysis	2.1	2.1.1
CO2	PO2: Problem analysis	2..2	2.2.2
CO3	PO2: Problem analysis	2.1	2.1.1
CO4	PO2: Problem analysis	2.3	2.3.1
CO5	PO2: Problem analysis	2.2	2.2.3

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Year: I **Semester: II**

Subject Code **20ABS9906**	Subject Name: **Differential Equations and Vector Calculus**	**L T P** **3 0 0**	Credits:3

Course Outcomes:

1.Apply the mathematical concepts of ordinary differential equations of higher order.

2. Solve the differential equations related to various engineering fields .

3. Identify solution methods for partial differential equations that model physical processes .

4. Interpret the physical meaning of different operators such as gradient, curl and divergence .

5. Estimate the work done against a field, circulation and flux using vector calculus .

UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral (e^{ax}, sinax (or) cosax, X^k, $e^{ax}v$, x v(x)), method of variation of parameters, simultaneous linear equations with constant coefficients.

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, Applications to simple pendulum, oscillations of a spring, L-C-R Circuit problems and Mass spring system.

UNIT III: Partial Differential Equations – First order

First order partial differential equations, solutions of first order linear and non-linear PDEs.
Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV:Vector differentiation

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities

UNIT V: Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Text Books :

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.

References:

1. Dr.T.K.V.Iyengar, Engineering Mathematics-I,S.Chand publishers
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics,Laxmi publication,2008
4. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.

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List of COs	**PO no. and keyword**	**Competency Indicator**	**Performance Indicator**
CO1	PO1:Apply the knowledge of mathematics	1.1	1.1.1
CO2	PO2:Analyse complex engineering problems	2.1	2.1.3
CO3	PO1:Apply the knowledge of mathematics	1.1	1.1.1
CO4	PO1:Apply the knowledge of mathematics	1.1	1.1.1
CO5	PO2:Analyse complex engineering problems	2.1	2.1.3

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Year: I **Semester: II**

Subject Code:20ABS9903	Subject Name: **Engineering Physics**	L T P 3 0 0	Credits:3

Course Outcomes

1. Explain physics applied to solve engineering problems.
2. Apply the principles of acoustics and ultrasonics in engineering applications.
3. Explains the applications of ultrasonics in various engineering fields.
4. Apply electromagnetic wave propagation in different Optical Fibers and the concepts of lasers in various applications.
5. Explains the concepts of dielectric and magnetic materials and Identify the sensors for various engineering applications

Unit I : Mechanics **8 Hrs**

Basic laws of vectors and scalars –Conservative and non-conservative forces- Vector differentiation and Gradient, F = - gradV - Angular momentum and Torque-Conservation of Energy, Momentum and Angular Momentum - motion of variable mass system, motion of a rocket -Moment of Inertia-radius of Gyration-Gravitational Force, Field and Potential- Kepler`s Laws-Proof of Kepler`s laws.

Unit II : Acoustics and Ultrasonics

Introduction to Acoustics – Reverberation – Reverberation time– Sabine's formula- Derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.
Introduction to Ultrasonics – Production of Ultasonic wave by magnetostriction & piezoelectric methods – Properties-acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, applications.

Unit III: Dielectric and Magnetic Materials

Dielectric polarizability, Susceptibility and Dielectric constant-Types of polarizations: Electronic , Ionic, Orientation Polarizations (Qualitative)-Frequency dependence of polarization-Lorentz (internal) field-Claussius-Mossotti equation-Applications of Dielectrics.
Introduction-Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of Magnetic materials-Domain Concepts of ferromagnetism – Hysteresis – soft and hard magnetic materials-Magnetic device applications.

Unit IV: Lasers and Fiber Optics

Introduction-Characteristics of Laser – Spontaneous and Stimulated emission of radiation-Einstein's coefficients-Population inversion-Pumping Mechanisms -He- Ne laser, Nd-YAG laser-Semiconductor laser-Applications of lasers.
Introduction to Optical Fibers – Total Internal Reflection-Construction of optical fibers, Critical angle of propagation – Acceptance angle – Numerical Aperture-Classification of fibers based on Refractive index, profile & modes – Propagation of electromagnetic wave through optical fiber-importance of V number-Block Diagram of Fiber optic Communication system-Industrial Applications.

Unit V: Sensors

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magnetostrictive sensors, Fibre optic methods of pressure sensing; Temperature sensors - bimetallic strip, pyroelectric detectors, Hall-effect sensor, smoke and fire detectors.

Textbooks:

1. M. N. Avadhanulu, P.G. Kshirsagar &TVS Arun Murthy". A Text book of Engineering Physics"-S.Chand Publications,11th Edition2019
2. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education, 2018.

References:

1. K.Thyagarajan "Engineering Physics",-Mc Graw Hill Publishing Company Ltd, 2016.
2. MKVarma "Introduction to Mechanics"-Universities Press-2015.
3. D.K. Bhattacharya and A.Bhaskaran,"Engineering Physics"-Oxford Publications-2015.
4. IanRSinclair,Sensor andTransducers,3rd eds,2001,Elsevier(Newnes).

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO1 : Apply the knowledge of science	1.2	1.2.1
CO: 2	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 3	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 4	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 5	PO1: Apply the knowledge of science	1.2	1.2.1

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Year: I **Semester**: II

Subject Code	Subject Name	L T P	Credits
20AES0202	Basics of Electrical &Electronics Engineering	3 0 0	3

Course Outcomes: Students should be able to
CO 1: Apply concepts of KVL/KCL in solving DC circuits
CO 2: Illustrate working principles of induction motor - DC Motor
CO 3: Identify type of electrical machine based on their operation
CO 4: Describe operation and characteristics of diodes and transistors.
CO 5: Make use of diodes and transistors in simple, typical circuit applications.
CO 6: Understand operation of basic op-amp circuits.

PART-A (Electrical Engineering)

UNIT-I: **DC & AC Circuits:**

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

UNIT-II: **DC & AC Machines:**

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [Elementary treatment only]

UNIT-III: Basics of Power Systems:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

Text Books:

1. D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, “Principles of Power System” – S.Chand – 2018.

References:

1. L. S. Bobrow - “Fundamentals of Electrical Engineering” - Oxford University Press - 2011.
2. E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.
3. C.L. Wadhwa – “Generation Distribution and Utilization of Electrical Energy”, 3rd Edition, New Age International Publications.

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PART-B (Electronics Engineering)

UNIT-I: Analog Electronics

Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: schottky diode, tunnel diode, varactor diode, photodiode, phototransistor and LED.

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

UNIT II: Digital Electronics

Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter

UNIT III: Communication Systems

Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Amplitude and Frequency modulation, Pulse modulation, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach).

Text Books:

1. D.P. Kothari, I.J.Nagrath, Basic Electronics, 2nd edition, McGraw Hill Education(India)Private Limited
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

References:

1. R. Muthu subramanian, S. Salivahanan, “Basic Electrical and Electronics Engineering”, Tata McGraw-Hill Education, Reprint 2012.
2. David Bell, Electronic Devices and Circuits: Oxford University Press, 5th edition. 2008.

Note: This table also should be in portrait only

CO	PO	CI	PI
CO1	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO2	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO3	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO4	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO5	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO6	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1

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Year: I **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20AES0509	**Basics of Python Programming**	3	0	0	3

Course Objectives:

- To learn the fundamentals of Python
- To elucidate problem-solving using a Python programming language
- To introduce a function-oriented programming paradigm through python
- To get training in the development of solutions using modular concepts
- To introduce the programming constructs of python

Unit – I

Introduction: What is a program, Running python, Arithmetic operators, Value and Types.
Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.
Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

Unit – II

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.
Conditionals and Recursion: floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.
Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types.

Unit – III

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.
Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.
Case Study: Reading word lists, Search, Looping with indices.
Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Unit – IV

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.
Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.
Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.
Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Unit – V

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning
Classes and Methods: Object oriented features, Printing objects, The init method, The __str__method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation
Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

The Goodies: Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args.

Course Outcomes:

Student should be able to

- Apply the features of Python language in various real applications.
- Select appropriate data structure of Python for solving a problem.
- Design object oriented programs using Python for solving real-world problems.
- Apply modularity to programs.

Text books:

1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.

Reference Books:

1. Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
3. R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019

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Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2020-21)
CIVIL ENGINEERING (CE)

Year: I **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20AES0301	Engineering Graphics	1	0	4	3

Course Outcomes:

CO: 1 Draw various curves applied in engineering.
CO: 2 Show projections of solids and sections graphically.
CO: 3 Draw the development of surfaces of solids.
CO: 4 Use computers as a drafting tool.
CO: 5 Draw isometric and orthographic.

Unit I: Introduction to Engineering graphics: Principles of Engineering Graphics and their significance- Conventions in drawing-lettering - BIS conventions.

a) Conic sections including the rectangular hyperbola- general method only,
b) Cycloid, epicycloids and hypocycloid
c) Involutes

Unit II: Projection of points, lines: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line.

Unit III: Projections of Planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.
Projections of Solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

Unit IV: Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.
Unit V: Orthographic Projections: Systems of projections, conventions and application to orthographic projections.
Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids.

Text Books and Reference Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers
3. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill
4. Shah and Rana, Engineering Drawing, 2/e, Pearson Education
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill

Additional Sources
YouTube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Engineering knowledge	1.3	1.3.1
CO: 2	PO 3: Design/Development of Solutions	3.2	3.2.1
CO: 3	PO 1: Engineering knowledge	1.3	1.3.1
CO: 4	PO 3: Design/Development of Solutions	3.2	3.2.2
CO: 5	PO 5: Problem analysis	5.1	5.1.1

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Year: I **Semester**: II

Subject Code	Subject Name	L	T	P	Credits
20AES0204	**Basics of Electrical & Electronics Engineering Lab**	0	0	3	1.5

Course Objectives: Students should be able to
CO1: Verify Kirchoff's Laws & Superposition theorem for dc supply
CO2.Analyze the performance of AC and DC Machines by testing.
CO3.Study I – V Characteristics of PV Cell & Perform speed control of dc shunt motor
CO4: Ability to operate diodes for finding V-I Characteristics.
CO5:Ability to construct and operate rectifiers without & with filters
CO6:Ability to construct and operate BJT & FET Characteristics.

List of Experiments:

PART-A

1.Verification of Kirchhoff laws.
2.Verification of Superposition Theorem.
3.Open circuit characteristics of a DC Shunt Generator.
4.Speed control of DC Shunt Motor.
5.OC & SC test of 1 – Phase Transformer.
6.Brake test on 3 - Phase Induction Motor.
7.Brake test on DC Shunt Motor
.

PART-B

1. PN Junction Diode Characteristics.
2. Zener Diode Characteristics.
3. Rectifiers (With and Without Filter).
4. BJT Characteristics (CB Configuration).
5. BJT Characteristics (CE Configuration).
6. FET Characteristics(CS Configuration).

Table: Course Outcomes (CO), Programme Outcomes (PO), Competency Indicator (CI) and Performance Indicator (PI) Mapping

CO	PO	CI	PI
CO1	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO2	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO3	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO4	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO5	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1

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Year: I **Semester**: II

Subject Code:20ABS9908	Subject Name: **Engineering Physics Lab**	L 0	T 0	P 3	Credits:1.5

Course Outcomes

1. Operate various optical instruments and Estimate wavelength of laser and particles size using laser.
2. Estimate the susceptibility and related magnetic parameters of magnetic materials and plot the intensity of the magnetic field of circular coil carrying current with distance
3. Evaluate the acceptance angle of an optical fiber and numerical aperture and determine magnetic susceptibility of the material and its losses by B-H curve
4. Identify the type of semiconductor i.e., n-type or p-type using Hall effect
5. Apply the concepts of sensors for various applications

List of Experiments

1. Determination of wavelength of LASER light using diffraction grating.
2. Determination of particle size using LASER.
3. Hall effect-Determination of Hall voltage and Hall coefficient of a given semiconductor.
4. Determination of Magnetic field along the axis of a circular coil carrying current.
5. Determination of Rigidity modulus of a wire-Torsional pendulum
6. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
7. Determination of numerical aperture of a given optical fiber and angle of acceptance
8. Study the variation of pressure using Strain Guage sensor
9. Study the variation of temperature using Strain Guage sensor.
10. Determination of Dielectric constant of dielectric material using charging and discharging of capacitor.
11. Determination of spring constant using Coupled Oscillator.
12. Determination of ultrasonic velocity in liquid using Acoustic grating.
13. Measurement of magnetic susceptibility by Gouy's method.
14. Study the variation of pressure using optical fiber sensors.
15. Study the variation of temperature using optical fiber sensors.

References:

1. S. Balasubramanian, M.N.Srinivasan, "A Text book of Practical Physics"-S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php-VirtualLabs, Amrita University.

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Year: I **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20AES0510	**Basics of Python Programming Lab**	0	0	3	1.5

Lab Outcomes:
Student should be able to

- Design solutions to mathematical problems.
- Organize the data for solving the problem.
- Develop Python programs for numerical and text based problems.
- Select appropriate programming construct for solving the problem.
- Illustrate object oriented concepts.

Laboratory Experiments

1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a Scientific Calculator

2. Write a function that draws a grid like the following**:**

```
+ - - - - + - - - - +
|         |         |
|         |         |
|         |         |
|         |         |
+ - - - - + - - - - +
|         |         |
|         |         |
|         |         |
|         |         |
+ - - - - + - - - - +
```

3. Write a function that draws a Pyramid with # symbols

```
                    #
          #         #       #
          #     #   #   #   #
        #   #     #   #   #   #
```

Up to 15 hashes at the bottom

4. Using turtles concept draw a wheel of your choice

5. Write a program that draws Archimedean Spiral

6. The letters of the alphabet can be constructed from a moderate number of basic elements, like vertical and horizontal lines and a few curves. Design an alphabet that can be drawn with a minimal number of basic elements and then write functions that draw the letters. The alphabet can belong to any Natural language excluding English. You should consider at least Ten letters of the alphabet.

7. The time module provides a function, also named time that returns the current Greenwich Mean Time in "the epoch", which is an arbitrary time used as a reference point. On UNIX systems, the epoch is 1 January 1970.

```
>>> import time
>>> time.time()
1437746094.5735958
```

Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.

8. Given n+r+1 <= 2r . n is the input and r is to be determined. Write a program which computes minimum value of r that satisfies the above.

9. Write a program that evaluates Ackermann function

10. The mathematician Srinivasa Ramanujan found an infinite series that can be used to generate a numerical approximation of 1/ π :

Write a function called estimate_pi that uses this formula to compute and return an estimate of π**.**

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

It should use a while loop to compute terms of the summation until the last term is smaller than $1e^{-15}$ (which is Python notation for 10^{-15}). You can check the result by comparing it to math.pi.

11. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-in functions.

12. Given a text of characters, Write a program which counts number of vowels, consonants and special characters.

13. Given a word which is a string of characters. Given an integer say 'n', Rotate each character by 'n' positions and print it. Note that 'n' can be positive or negative.

14. Given rows of text, write it in the form of columns.

15. Given a page of text. Count the number of occurrences of each latter (Assume case insensitivity and don't consider special characters). Draw a histogram to represent the same

16. Write program which performs the following operations on list's. Don't use built-in functions

a) Updating elements of a list
b) Concatenation of list's
c) Check for member in the list
d) Insert into the list
e) Sum the elements of the list
f) Push and pop element of list
g) Sorting of list
h) Finding biggest and smallest elements in the list
i) Finding common elements in the list

17. Write a program to count the number of vowels in a word.

18. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them to lowercase.

19. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Read the book you downloaded, skip over the header information at the beginning of the file, and process the rest of the words as before. Then modify the program to count the total number of words in the book, and the number of times each word is used. Print the number of different words used in the book. Compare different books by different authors, written in different eras.

20. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Write a program that allows you to replace words, insert words and delete words from the file.

21. Consider all the files on your PC. Write a program which checks for duplicate files in your PC and displays their location. Hint: If two files have the same checksum, they probably have the same contents.

22. Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object oriented approach.

23. Write a program illustrating the object oriented features supported by Python.

24. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them into distinction, first class, second class, third class and failed.

25. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.

26. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)

Reference Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition,
Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016

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CIVIL ENGINEERING (CE)

B.Tech- I Year **Semester: II**

Subject Code 20AMC9902	Subject Name CONSTITUTION OF INDIA	L 2	T 0	P 0	Credits: 0

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the Powers and functions of Governor, President, Judiciary.
5. Discuss the functions of local administration bodies.

Syllabus

Unit:1 **4 hrs**

History of Making of the Indian Constitution - History Drafting Committee, (Composition & Working)

Unit:2 **8 hrs**

Philosophy of the Indian Constitution - Preamble Salient Features

Unit:3 **8hrs**

Contours of Constitutional Rights & Duties - Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies - Directive Principles of State Policy - Fundamental Duties.

Unit:4 **8hrs**

Organs of Governance - Parliament – Composition - Qualifications and Disqualifications - Powers and Functions - Executive, President, Governor - Council of Ministers -Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions.

Unit:5 **8hrs**

Local Administration - District's Administration head: Role and Importance - Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation - Pachayati raj: Introduction, PRI: ZillaPachayat - Elected officials and their roles, CEO Zilla Panchayat: Position and role - Block level: Organizational Hierarchy (Different departments) - Village level: Role of Elected and Appointed officials - Importance of grass root democracy.

Suggested books for reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO 1	PO 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	6.2.	6.2.1
CO 2	PO 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	6.2.	6.2.1
CO 3	PO 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	6.2.	6.2.1
CO 4	PO 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	6.2.	6.2.1
CO 5	PO 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	6.2	6.1.1

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Year : II B.Tech **Semester: I** **Branch of Study: CE and ME**

Subject Code:20ABS9913	**SubjectName:** Probability & Statistics, Partial differential equations	**L T P** **3 0 0**	**Credits** **3**

Course Outcomes:

1) Understand the concepts of Central Tendency, Correlation, Regression concepts.
2) Apply discrete and continuous probability distributions
3) Design the components of a classical hypothesis test for large samples.
4) Infer the statistical inferential methods based on small sampling tests.
5) Find the general solution of the PDEs bearing applications

Unit I: Descriptive statistics:
Measures of Central tendency, Measures of Variability (spread or variance), correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines

Unit II: Probability
probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous)**,** probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

Unit III: Testing of Hypothesis
Formulation of null hypothesis, critical regions, level of significance. Large sample tests: test for single proportion, difference of proportions, test for single mean and difference of means.

Unit IV: Small Sample Tests
Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit.

Unit V: Applications of Partial Differential Equations
Method of separation of variables, solution of 1D-wave, 1D-heat and 2D-Laplace's equation in Cartesian coordinates

Text Books:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

References:
1. S.Chand ,Engineering Mathematics-II by Dr.T.K.V.Iyengar, Dr.B.Krishna Gandhi, S.Ranganatham, Dr.M.V.S.S.N.Prasad
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.
3. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India,1995.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

List of COs	**PO no. and keyword**	**Competency Indicator**	**Performance Indicator**
CO1	PO1: Apply the knowledge of mathematics	1.1	1.1.1
CO2	PO1: Apply the knowledge of mathematics	1.1	1.1.1
CO3	PO1: Apply the knowledge of mathematics	1.1	1.1.1
CO4	**PO1: Knowledge of Engineering fundamentals**	**1.2**	**1.2.2**
CO5	PO2: First principles of mathematics	2.4	2.4.1

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Year: II **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APC0101	Mechanics of Materials	3	0	0	3

Course Outcomes:

1: Understand the system of forces on bodies.
2: Determine the centroid and moment of inertia for different cross-sections.
3: Understand the concepts of stress, strain, generalized Hooke's law, elastic modulii
4: Develop shear force and bending moment diagrams for different load cases.
5: Compute the slope and deflection of simple beams

UNIT - I

Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams and Equations of Equilibrium of Coplanar Systems, support reactions for simply supported beam.

UNIT - II

Centroid and Center of Gravity: Introduction – Centroids of rectangular, triangular, circular, I, L and T sections. **Area moment of Inertia**: Introduction – Definition of Moment of Inertia of rectangular, triangular, circular, I, L and T sections - Radius of gyration, perpendicular axis theorem and parallel axis theorem.

UNIT – III

Simple Stresses and Strains:

Types of stresses and strains – Hooke's law – Stress – strain diagram for mild steel – working stress – Factor of safety – lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of Varying section – Composite bars – Temperature stresses.

UNIT – IV

Shear Force and Bending Moment:

Definition of beam – types of beams – Concept of Shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and over changing beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam.

UNIT – V

Deflection of Beams: Uniform bending – slope, deflection and radius of curvature - Determination of slope and deflection for cantilever and simply supported beams under point loads and U.D.L. -Mohr's theorems – Moment area method –Conjugate beam method.

TEXT BOOKS:

1. R.K Bansal, Engineering Mechanics, Lakshmi Publications.
2. R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.
3. R. Subramanian, Strength of Materials, Oxford University Press.

REFERENCES:

1. S.S. Bhavakatti, Engineering Mechanics, New Age Publishers.

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Year: II **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APC0102	Surveying	3	0	0	3

Course Outcomes:
1: Understand basic principles of surveying, Prismatic compass
2: Understand basic concepts of leveling and contouring and Theodolite survey
3. Understand Computation of Areas and Volumes
4: Understand and able to set the curves on field.
5: Understand modern techniques in the survey systems.

UNIT – I:
Basics of Surveying: Definition, principles and classification of surveying - Principles of chain survey – Types of chains - Tape corrections – types of Ranging - Construction and working of prismatic compass – Types of bearing - Declination, local attraction.

UNIT – II:
Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method.
Contouring- Characteristics and uses of Contours - methods of contour surveying, interpolation and sketching of Contours.
Theodolite Surveying: Measurement of horizontal and vertical angles-reiteration and repetition methods.

UNIT – III:
Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary - Volume- trapezoidal and prismoidal formula-
Determination of volume of earth work in cutting and embankments.

UNIT – IV:
Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves-problems.
Construction surveys: Introduction-setting out of buildings-highways culverts.

UNIT – V:
Modern Field Survey Systems:
EDM and Total Station: Measurement principle of EDM - EDM instrument characteristics - Accuracy in EDM - Total station – Introduction – Advantages - Types and applications of total station - Field procedure.
Differential Global Positioning System (DGPS): Introduction - Working principle - DGPS receivers - Applications of DGPS.

Text Books:
1. Arora, K.R. I, Surveying, Vol-I, II and II, Standard Book House, 2015.
2. C. Venkatramaiah, Text Book of Surveying, Universities Press Pvt Ltd, Hyderabad. Revised Edition 2011.
3. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying (Vol – 1,2 &3), by – Laxmi Publications (P) Ltd., New Delhi.
4. N.N. Basak, Surveying and Levelling- Tata McGraw-Hill Education, 2017.

References :

1. Manoj K., Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011.
2. Madhu N., Sathikumar, R. and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
3. Chandra A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
4. Anji Reddy M., Remote sensing and Geographical information system, B.S. Publications, 2001.

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Year: II **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APC0103	Fluid Mechanics	3	0	0	3

Course Outcomes:

1: Understand basic characteristics and behavior of fluids
2: Understand concepts of fluid statics, different equipment and their applications stability of floating bodies
3: Understand fundamentals of fluid kinematics and Differentiate types
of fluid flows
4: Understand and apply experiments with different equipments under fluid flow
5: Estimate Energy losses in pipelines and Determine flow characteristics Through closed conduits.

UNIT – I:

Basic concepts and definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Newton law of viscosity, Kinematic and dynamic viscosity; variation of viscosity with temperature,; vapor pressure, surface tension, capillarity, Bulk modulus of elasticity, compressibility.

UNIT – II:

Fluid statics: Fluid Pressure: Pressure at a point, Pascal's law, and pressure variation with temperature. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT – III:

Fluid kinematics: Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -dimensional continuity equations in Cartesian coordinates.

UNIT – IV:

Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter; Momentum principle; Forces exerted by fluid flow on pipe bend; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

UNIT -V:

Analysis of Pipe Flow: Energy losses in pipelines; Friction factor for pipe flow, Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length- Pipes in series and parallel

Text Books:

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill.

REFERENCES:

1. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
2. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
4. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers

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Year: II **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20AHSMB01	Managerial Economics and Financial Analysis	3	0	0	3

Course Outcomes:

- Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns.
- Evaluate the capital budgeting techniques.
- Define the concepts related to financial accounting and management and able to develop the accounting statements and evaluate the financial performance of business entity.

UNIT – I Managerial Economics

Introduction – meaning, nature, meaning, significance, functions, and advantages, ME and its role in other fields. Demand - Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing forecasting, Methods.

UNIT – II Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and Long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT III Business Organizations and Markets

Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT IV Capital Budgeting

Introduction to Capital, Sources of Capital. Short-term and Long-term Capital : Working capital, types, Estimating Working capital requirements. Capital Budgeting – Features, Proposals, Time value of money. Methods and Evaluation of Projects – Pay Back Method, Accounting Rate of Return (ARR), Net Present Value (NPV), and Internal Rate Return (IRR) Method (simple problems).

UNIT V Financial Accounting and Analysis

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). **Financial Analysis -** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019
3.

Reference Books:

1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New AgeInternational, 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, NewDelhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage,2013.

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CIVIL ENGINEERING (CE)

Year: II **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APC0104	Strength of Materials Lab	0	0	3	1.5

Course Outcomes:

1: Determine the properties of material
2: Determine the compressive strength of wood or concrete
3: Examine the Polygon law of Co-planar forces and principle of moments
4: Solve the Reactions at the supports.
5: Determine the bending and deflection of beam

LABORATORY EXPERIMENTS:

1. Support reactions test on simply supported beam
2. Bell Crank Lever test
3. Tension test .
4. Bending test on (Steel/Wood) Cantilever beam.
5. Bending test on simply supported beam.
6. Torsion test.
7. Hardness test.
8. Compression test on Open coiled springs
9. Compression test on Closely coiled springs
10. Compression test on wood/ concrete
11. Izod / Charpy Impact test on metals
12. Shear test on metals
13. Continuous beam – deflection test.

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Year: II **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APC0105	Surveying Lab	0	0	3	1.5

Course Outcomes:

1: Understand basic principles of plane table surveying and fly leveling.
2: Understand basic concepts of theodolite survey and trigonometric leveling
3: Understand basic concepts of total station
4:Uunderstand the components of simple curve and able to set the curve on field.
5: Understand modern techniques in the survey systems.

LIST OF FIELD WORKS:

1. Chain Survey: Finding the area of a given boundary
2. Plane table survey: Finding the area of a given boundary
3. Compass Survey: Determining the Horizontal Angles and Area
4. Fly levelling: Height of the instrument method and rise and fall method.
5. Measurement of Horizontal and vertical angle by Theodolite
6. Determination of height of building using Theodolite
7. Total Station: Determination of Remote height and distance.
8. Total Station: Determination of area.
9. Total Station: Preparation of contour maps for small area
10. Stake out using total station

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Year: II **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APC0106	Fluid Mechanics Lab	0	0	3	1.5

Course Outcomes:

1. Verify Bernoulli's theorem
2. Calibrate flow measuring devices such as Venturimeter, orifice meter and notch
3. Determine friction factor in pipes
4. Determine minor losses in the pipes
5. Determination of Coefficient of discharge for orifice and mouth piece

LABORATORY EXPERIMENTS

1. Verification of Bernoulli's equation.
2. Calibration of Venturimeter
3. Calibration of Orifice meter
4. Determination of Coefficient of discharge for a small orifice by constant head method.
5. Determination of Coefficient of discharge for an external mouth piece by variable head method.
6. Calibration of contracted Rectangular Notch
7. Calibration of contracted Triangular Notch
8. Determination of friction factor

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Year: II **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20AMC9903	Environmental Studies	0	0	3	1.5

Course Outcomes:

1. Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
2. Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
3. Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
4. . Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
5. To get knowledge on various environmental acts and to engage all the students life - long learning of rain water harvesting

UNIT – I

Multidisciplinary Nature o**f Environmental Studies:** Introduction − Multidisciplinary Nature of Environmental Studies − Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable energy resources – Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and sub-surface – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.

Energy resources: Renewable and non-renewable energy resources.

UNIT – II

Ecosystems: Concept of an ecosystem. – Structure and functions of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity And Its Conservation : Introduction- Definition: genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man − wildlife conflicts − Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

Environmental Pollution: Definition, Causes, effects and its control measures of : Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards.

Solid Waste Management: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone, Tsunami and landslides.

UNIT – IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting and watershed management – Resettlement and rehabilitation of people − Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies– Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act − Public awareness.

UNIT – V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

TEXT BOOKS:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Kaushik, New Age Publishers.
3. Environmental Studies by Sri Krishna Hitech publishing Pvt. Ltd.

REFERENCES:

1. Environmental studies by R.Rajagopalan, Oxford University Press.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.
4. Environmental studies by A. Ravi Krishnan, G. Sujatha Sri Krishna Hitech publications.

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Year: II **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20ABS9922	Mathematical Modeling & Optimization Techniques	3	0	0	3

Course Outcomes:

1. Know about the classifications and stages of mathematical modelling.
2. Understand building of mathematical models.
3. Study the behaviour of mathematical models.
4. Formulate a linear programming problem and solve it by various methods.
5. Give an optimal solution in assignment jobs, give transportation of items from sources to destinations.

Unit I: Introduction to Modelling, Building Models, Studying Models
What is mathematical modelling? What objectives can modelling achieve? Classifications of models Stages of modelling . Systems analysis- Making assumptions- Flow diagrams- Choosing mathematical equations.

Unit II: Studying Models
Equations from the literature- Analogies from physics-Data exploration, Dimensionless form - Asymptotic behaviour- Sensitivity analysis - Modelling model output

Unit III: Linear programming problems(LPP)
Linear programming problems (LPP)-Graphical method-Simplex method-Big M Method-Dual simplex method.

Unit IV: Transportation & Assignment Problem
Formulation of transportation model, Basic feasible solution using different methods, Optimality Methods, Unbalanced transportation problem, Degeneracy in transportation problems, Applications of Transportation problems. Assignment Problem: Formulation, unbalanced assignment problem, Travelling salesman problem.

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Unit V: Game Theory
Formulation of games, Two person-Zero sum game, Mini max and Max min Principle, games with and without saddle point, Rules of dominance, Solving a 2x2 game using graphical method.

TEXT BOOKS:

1. Mathematical Modeling: by Majid Jaberi-Douraki and Seyed M. Moghadas
2. Operations Research , S.D. Sharma.

REFERENCES:

1. Mathematical Models in Applied Mechanics A.B. Tayler
2. Operations Research, An Introduction, Hamdy A. Taha, Pearson publishers.

Online Learning Resources:
https://people.maths.bris.ac.uk/~madjl/course_text.pdf

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Year: II **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APC0108	Strength of Materials	3	0	0	3

Course Outcomes:

1: Identify critical planes in two dimensional stress systems
2: Compute slopes and deflections of beams with different boundary conditions
3: Determine shear stresses for different shapes.
4: Analyze members under torsion, combined torsion and bending moment for determination of energy absorption
5: Determine the Load carrying capacity of column by using different approaches

UNIT – I

Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/Y = E/R – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hallow), I, T, Angle and Channel Sections – Design of simple beam sections.

UNIT – II

Shear Stresses: Derivation of formula-Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections. Combined bending and shear.
Combined Direct and Bending stresses: Introduction-eccentric loading – columns with eccentric loading – symmetrical columns with eccentric loading about one axis –about two axes – Unsymmetrical columns with eccentric loading – limit of eccentricity.

UNIT – III

Columns and Struts: Introduction – classification of columns – Axially loaded compression members – Euler's crippling load theory – derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula.

UNIT – IV

Torsion: Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – power transmission through shafts – Combined bending and torsion.

UNIT – V

Compound Stresses and Strains: Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain.
Theories of Failures: Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

TEXT BOOKS:

R.K Bansal, Engineering Mechanics, Lakshmi Publications.
R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.
R. Subramanian, Strength of Materials, Oxford University Press.

REFERENCES:

S.S. Bhavakatti, Engineering Mechanics, New Age Publishers.
S. Timoshenko, D.H. Young and J.V. Rao, Engineering Mechanics, Tata McGraw-Hill Company.
Sadhu Singh, Strength of Materials, Khanna Publishers 11th edition 2015.

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Year: II **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APC0109	Hydraulic Engineering	3	0	0	3

Course Outcomes:

1: Understand Laminar Flow and Turbulent flow through plates
2: Understand different formulae on open channel flow and design open-channel flow systems.
3: Understand the concepts of varying flow in pipes and Measure discharge and velocity
4: Understand hydrodynamic force of jets different vanes and design Pelton wheel, Francis and Kaplan turbine
5: Understand principles of centrifugal pumps and Calculate losses and efficiencies of centrifugal pumps

UNIT – I:

Laminar & Turbulent flow in pipes: Laminar Flow- Laminar flow through: circular pipes. Stoke's law, Measurement of viscosity. Turbulent Flow-Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability.,

UNIT – II:

Uniform flow in Open Channels: Open Channel Flow-Comparison between open channel flow and pipe flow, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Chezy's formula, Manning's formula. Computation of Uniform flow.

UNIT – III:

Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification.

UNIT – IV:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - velocity triangles at inlet and outlet - Work done and efficiency.

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design – efficiency - Draft tube: theory - characteristic curves of hydraulic turbines.

UNIT -V:

Centrifugal pumps: Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Dimensional analysis and hydraulic similitude.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria & Sons.

REFERENCES:

1. Rajput, Fluid mechanics and fluid machines , S. Chand & Co
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.
3. Srinivasan, Open channel flow by, Oxford University Press
4. Banga & Sharma, Hydraulic Machines, Khanna Publishers.

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Year: II **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APC0110	Structural Analysis-I	3	0	0	3

Course Outcomes:

1. Apply energy theorems for analysis of indeterminate structures
2. Analyze indeterminate structures with yielding of supports
3. Analyze beams using slope deflection distribution method
4. Analyze beams using moment distribution methods
5. Analyze the Determinate and Indeterminate trusses

UNIT – I

Fixed Beams: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies- Analysis of fixed beams - uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load and combination of loads – Shear force and Bending moment diagrams – effect of sinking of support, effect of rotation of a support.

UNIT – II

Slope-Deflection Method: Introduction- derivation of slope deflection equation- application to continuous beams with and without settlement of supports.

UNIT – III

Moment Distribution Method: Introduction to moment distribution method- application to continuous beams with and without settlement of supports.

UNIT – IV

Energy Theorems: Strain energy – Resilience – Gradual, Sudden and impact loadings – simple applications. Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force – Castigliano's first theorem -Deflections of simple beams (Determinate beams).

UNIT – V

Analysis of Determinate and Indeterminate Trusses: Analysis of Determinate trusses by method of joints - Analysis of Indeterminate trusses with single degree internal and external indeterminacy – Castigliano's theorems.

Text Books:

1. S.S. Bhavikatti, "Structural Analysis", Volume 1 and 2, Vikas Publishing House, Pvt. Ltd.
2. S. Ramamurtham, "Theory of Structures", Dhanpat Rai Publishing Company (p) Ltd, 2009
3. C. S. Reddy, "Basic Structural Analysis", Tata McGraw Hill

References:

1. Timoshenko & Young, "Theory of Structures", Tata McGraw Hill
2. S. B. Junarkar, "Structural Mechanics" Vol I & II, Charotar Publishers
3. C. K. Wang, "Intermediate Structural Analysis", McGraw Hill

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Year: II **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APC0111	Concrete Technology	3	0	0	3

Course Outcomes: After the completion of the course student should be able to

1. Understand various ingredients of concrete and their role.
2. Examine knowledge on the fresh and hardened properties of concrete.
3. Know the engineering properties and non-destructive testing methods of normal concrete.
4. Understand the durability problems and remedial measure in the concrete.
5. Design of concrete mixes using BIS methods.

UNIT I

Cement& admixtures: Portland cement – Chemical composition - Properties of Bogue's compounds – Hydration, Setting of cement – Tests on physical properties – Different grades of cement. Admixtures: Types of admixtures – mineral and chemical admixtures.

UNIT - II

Aggregates, water & manufacture of concrete: Classification of aggregate – Particle shape & texture-properties of aggregate – Specific gravity, Bulk density, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate - Alkali aggregate reaction – Sieve analysis – Fineness modulus –Grading of Aggregates - Quality of mixing water–Steps in manufacture of concrete –Curing.

UNIT – III

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by slump test, compaction factor test and Vee-Bee test – Segregation & bleeding

Hardened Concrete: Water / Cement ratio – Abram's Law – Compression test –Flexure test – Splitting test - Factors affecting strength – Relation between compression and tensile strength

UNIT - IV

Non-destructive testing: Non-destructive testing methods - UPV and Rebound Hammer tests.

Elasticity, Creep & Shrinkage: – Static Modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Shrinkage – types of shrinkage.

UNIT – V

Mix Design: Factors in the choice of mix proportions – Quality Control of concrete – Proportioning of concrete mixes by various methods – BIS method of mix design.

Durability of concrete: Durability concept - Permeability of concrete - Methods to increasing durability of concrete.

TEXT BOOKS:

1. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004
2. Concrete Technology by A.R. Santhakumar, 2nd Edition, Oxford university Press, New Delhi
3. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

REFERENCES:

1. Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc-Graw Hill Publishers

IS Codes:

IS 383, IS 516, IS 10262 – 2019

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II B.Tech **Branch Common to all**

Subject Code 20AHS9905	Subject Name **Universal Human Values**	L T P 3 1 0	Credit: 3

Course Objectives

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence

3. Strengthening of self-reflection.

4. Development of commitment and courage to act.

UNIT – 1**: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current. scenario
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

UNIT II**: Understanding Harmony in the Human Being - Harmony in Myself!**

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

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

UNIT III: **Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship**.

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT IV: **Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
- Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT- V**: Implications of the above Holistic Understanding of Harmony on Professional Ethics.**

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

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

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

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

TEXT BOOKS

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCE BOOKS

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. FSchumacher. "Small is Beautiful"
6. Slow is Beautiful –Cecile Andrews
7. J C Kumarappa "Economy of Permanence"
8. Pandit Sunderlal "Bharat Mein Angreji Raj"
9. Dharampal, "Rediscovering India"
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland(English)
13. Gandhi - Romain Rolland (English)

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List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO 1	**PO 7: Environment and sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development	7.1	7.1.2
CO 2	**PO 7: Environment and sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development	7.1	7.1.2
CO 3	**PO 8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	8.1 8.2	8.1.1 8.2.2
CO 4	**PO 8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	8.1 8.2	8.1.1 8.2.2
CO5	**PO 8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	8.1 8.2	8.1.1 8.2.2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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CIVIL ENGINEERING (CE)

Year: II **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APC0112	Hydraulic Machinery Lab	0	0	3	1.5

Course Outcomes:

1. Able to determine minor losses in pipes
2. Understand the concept of formation of hydraulic jump
3. Determine the performance of hydraulic turbine and pumps under different working conditions

LABORATORY EXPERIMENTS

1. Study of Hydraulic jump
2. Impact of jet on vanes
3. Performance test on Pelton wheel turbine.
4. Performance test on Francis turbine.
5. Efficiency test on single stage centrifugal pump.
6. Efficiency test on Multi stage centrifugal pump.
7. Efficiency test on reciprocating pump.
8. Determination of Coefficient of loss of head in minor losses(Pipe fittings)

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Year: II **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APC0113	Concrete Technology Lab	0	0	3	1.5

Course Outcomes:

1. Determine the properties of cement as per IS specifications.
2: Determine the properties of aggregates as per IS specifications.
3: Determine the properties of fresh concrete as per IS specifications.
4: Determine the properties of hardened concrete as per IS specifications.
5: Determine the strength of concrete using Rebound hammer method.

List of Experiments

1. Normal Consistency and 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 mortar.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Compressive strength, Tensile strength and Young's modulus of concrete.
7. Specific Gravity and Water Absorption of Coarse aggregate.
8. Bulking of Fine aggregate.
9. Specific Gravity and Water Absorption of fine aggregate.
10. Grain size distribution of coarse aggregate and fine aggregate
11. Non-Destructive testing on concrete (for demonstration)

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Year: II **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APC0114	Computer-aided Civil Engineering Drawing Lab	0	0	3	1.5

Course Outcomes:

1. Understand the concepts and basics of CAD
2. Understand the building plan elevation and section drawings
3. Understand the building components drawings

LIST OF THE EXPERIMENTS

1. Introduction to computer aided drafting and Practice exercises on CAD Commands
2. Drawing of plans for Single storey buildings
3. Drawing of plans for Multi storey buildings
4. Development of sections and elevations for Single storey buildings
5. Development of sections and elevations for Multi storey buildings
6. Detailing of building components like doors, windows
7. Development of building components roof trusses