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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	Scheme of 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	Scheme of 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	3	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	Scheme of 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	2	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

Community Service Project (Mandatory) for 6 weeks duration during summer vacation.

(To visit the selected community to conduct survey (Socio-economic & domain survey) and conduct sensitization/awareness program/activities at the end of IV- semester before commencement of V-semester and complete immersion programme also during V-Semester and submit report in V - semester. Assessment will be done at the end of V-Semester)

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	L	T	P	C	CIE	SEE	Total
1	Professional core course	20APC0116	Soil Mechanics	3	0	0	3	30	70	100
2	Professional core course	20APC0117	Building Technology	3	0	0	3	30	70	100
3	Professional core course	20APC0118	Engineering Geology	3	0	0	3	30	70	100
4	Open Elective course / Job Oriented Elective	20APE0417	Sensor Networks	3	0	0	3	30	70	100
		20APC0323	Operations Research							
		20AOE0302	Management Science							
5	Professional Elective courses	20APE0101	Structural Analysis-II	3	0	0	3	30	70	100
		20APE0102	Water Harvesting and Conservation							
		20APE0103	Cost Effective Housing Techniques							
6	Professional core courses (LAB)	20APC0119	Soil Mechanics Lab	0	0	3	1.5	30	70	100
7	Professional core courses (LAB)	20APC0120	Engineering Geology Lab	0	0	3	1.5	30	70	100
8	**Skill Oriented Course***	20APC0121	Building planning & Drawing Lab	1	0	2	2	100	-	100
9	Mandatory course (AICTE suggested)	20AMC9904	Professional Ethics and Human Values	3	0	0	0	30	-	30
10	**CSP**	20CSP0101	Community service project	0	0	0	1.5	100	-	100
Total credits							**21.5**	**440**	**490**	**930**
Honors/ Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4**	**30**	**70**	**100**

S. No	Professional Electives*	Open Electives*
1	Air Pollution and Control	An introduction to Artificial intelligence
2	Basic construction materials	Industrial Safety Engineering
3	Pavement Materials	Leadership and Team Effectiveness
4	Energy Efficiency, Acoustics and Day lighting in Building	Education for Sustainable Development
5	Remote Sensing Essentials	Organizational Behavior
6	Ground Improvement	Environment and Development
7	Availability And Management Of Groundwater Resources	Indian Art: Materials, Techniques And Artistic Practices
8	Integrated Waste Management For A Smart City	Human Resource Development
9	Sustainable Transportation Systems	Entrepreneurship
10	Bridge Engineering	Geographic Information System
11	Municipal Solid Waste Management	Patent Law for Engineers and Scientists
12	Admixtures And Special Concretes	Training and Development
13	Characterization of Construction Materials	Talent Acquisition and Management
14	Soil Structure Interaction	Principles of Management
15	Water Supply Engineering	E-Business

*Student shall register any number of MOOC courses listed above (Professional/ Open) by the department as approved by the BOS. But student is required to submit the pass certificate on NPTEL platform for at least one course with in the Programme duration (Before IV-II examination notification).

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Semester VI (third year)

Sl. No.	Category	Course Code	Course Title	Hours per week				Credits	Scheme of Examination (Max. Marks)		
				L	T	P	C		CIE	SEE	Total
1	Professional core course	20APC0122	Environmental Engineering	3	0	0	3		30	70	100
2	Professional core course	20APC0123	Highway Engineering	3	0	0	3		30	70	100
3	Professional core course	20APC0124	Foundation Engineering	3	0	0	3		30	70	100
4	Professional Elective courses	20APE0104	Design and Drawing of Reinforced concrete Structures	3	0	0	3		30	70	100
		20APE0105	Intelligent Transport System								
		20APE0106	Remote Sensing and GIS								
5	Professional core courses (LAB)	20APC0125	STAAD Lab	0	0	3	1.5		30	70	100
6	Professional core courses (LAB)	20APC0126	Environmental Engineering lab	0	0	3	1.5		30	70	100
7	Professional core courses (LAB)	20APC0127	Highway Engineering Lab	0	0	3	1.5		30	70	100
8	**Skill Oriented Course***	20AHE9902	Principles of effective public speaking	1	0	2	2		100	-	100
9	Mandatory course (AICTE suggested)	20AMC9901	Biology for Engineers	3	0	0	0		30	-	30
	Total credits							18.5	340	490	830
	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	Scheme of Examination (Max. Marks)		
				L	T	P	C	CIE	SEE	Total
1	Professional Elective courses	20APE0107	Estimation Costing & Valuation	3	0	0	3	30	70	100
		20APE0108	Environmental Impact Assessment and Management							
		20APE0109	Railways airport Docks and Harbours							
2	Professional Elective courses	20APE0110	Hydrology and Water Resources Engineering	3	0	0	3	30	70	100
		20APE0111	Design and Drawing of irrigation structures							
		20APE0112	Water shed and river management							
3	Professional Elective courses	20APE0113	Design and Drawing of steel Structures	3	0	0	3	30	70	100
		20APE0114	Advanced Structural Design							
		20APE0115	Bridge Engineering							
4	Open Elective course / Job Oriented Elective	20APC0516	Computer Networks	3	0	0	3	30	70	100
		20AHSMB02	Entrepreneurship							
		20AHSMB04	Intellectual Property Rights							
5	Professional Elective courses (CBCS)	20APE0116	Pre-stressed Concrete	3	0	0	3	30	70	100
		20APE0117	Ground Improvement Techniques							
		20APE0118	Repair and Rehabilitation of Structures							
6	**Humanities & Social Science Elective***	20AOE9901	English For Research Paper Writing	3	0	0	3	30	70	100
		20AHE9903	Professional Communication							
7	**Skill Advanced Course***	20APC0129	Structural Analysis Design software	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	MOOC (NPTEL) (12 Weeks)			3	0	0	3	25	75	100
2	Major Project	PROJ	Project Work, Seminar	0	0	0	9	60	140	200
3	Internship (3 Months)						3	100	-	100
	Total credits						15	185	215	400

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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	Scheme of 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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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.Make use of matrix algebra techniques that is needed by engineers for practical applications.
2.Utilize mean value theorems to real life problems.
3.Interpret with functions of several variables which is useful in optimization.
4.Analyze 2- dimensional and 3- dimensional concepts in coordinate systems
5.Utilize the concept of special functions

Unit I : Matrix Operations and Solving Systems of Linear Equations   12 hrs
Rank of a matrix by echelon form, Consistency of system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors of the matrix of the linear transformation 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 of functions of single variable 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 of plane regions enclosed by plane curves. Evaluation of triple integrals(Cartesian coordinates only).

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.VIyengar, B.Krishna Gandhi, S. Ranganathamamd 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, McGraw Hill Education.
4. N.Bali, M.Goyal, C.Watkins, Advanced Engineering Mathematics, Infinity Science Press.

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Mapping of course outcomes with program outcomes

Course Outcomes	Programme Outcomes(POs) & Programme Specific Outcomes(PSOs)													
	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3													
CO2	3													
CO3	3													
CO4		3												
CO5		3												

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: I **Semester**: **I**

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

Course Outcomes:
1. Understand the disadvantages of using hard water in domestically and industrially and select suitable treatments
2. Apply the electrochemical principles to the construction of battery and fuel cells, understand the corrosion prevention methods and factors affecting corrosion
3. Outline the preparation, mechanism, properties and applications of polymer and conducting polymers and Interpret the different types of conventional and nonconventional fuels
4. Understand the manufacturing of Portland cement and properties of concrete
5. Utilize the applications of physicochemical methods in surface characterization of solids

Unit 1: Water Technology **(8 hrs)**
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: **(10 hrs)**
Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells – Button Cells & Zinc –Air Battery, 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: **(12 hrs)**
Polymers-Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization and stereospecific polymerization with specific examples and mechanisms of polymer formation.
Plastics-Thermoplastics and Thermosetting Plastics,
Elastomers–Buna-S, Buna-N–preparation, properties and applications.
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: **(8 hrs)**
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: **(10 hrs)**

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Introduction to surface chemistry, colloids, synthesis of colloids (any two methods with examples), stabilization of colloids, micelle formation, BET equation (no derivation), chemical and electrochemical methods for the preparation of nanometal and metal oxides (not more than two methods), characterization of surface by physicochemical methods (SEM, TEM and XRD), 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.
3. Engineering Chemistry by G V Subba Reddy, K N Jayaveera and C Ramachandraiah, Mc Graw Hill education (India) Private Limited.

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.

Mapping of course outcomes with program outcomes

Course Outcomes	Programme Outcomes(POs) & Programme Specific Outcomes(PSOs)													
	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3													
CO2	3		1											
CO3	3		1											
CO4	3													
CO5	3				2									

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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I-Year   Semester:**I**

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

Course Outcomes:

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English.

CO2: Apply grammatical structures to formulate sentences and correct word forms

CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions

CO4: Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.

CO5: Create a coherent paragraph interpreting a figure/graph/chart/table

UNIT -1

Lesson: On the Conduct of Life: William Hazlitt

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: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

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- I : Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form – Wh questions; word order in sentences.

Vocabulary -2: Formal/academic words and phrases.

UNIT -2

Lesson: The Brook: Alfred Tennyson

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: 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 & Vocabulary building-1: Cohesive devices – linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Vocabulary building: 2 Idioms and Phrases, Homonyms, Homophones and Homographs.

UNIT -3

Lesson: The Death Trap: Saki

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:** 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.

Grammar and Vocabulary building-II: Direct and indirect speech, reporting verbs for academic purposes.

Technical Writing-1: personal experiences, unforgettable incidents, travelogues. (Imaginative, Narrative and Descriptive)

UNIT-4

Lesson: Innovation: Muhammad Yunus

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

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

Reading: Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters/Report writing**, *e-mail writing***

Grammar and Vocabulary: Quantifying expressions – adjectives and adverbs; comparing and contrasting; Voice – Active & Passive Voice.

Vocabulary:2 : Jigsaw Puzzles, Vocabulary Activities through Web tools

UNIT -**5**

Lesson: Politics and the English Language: George Orwell

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: 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.

Technical Writing-2: Narrative short story, News paper articles on science fiction.

Text Book:

1. Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

Reference Books:

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.

2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.

3. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book

4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

5. Oxford Learners Dictionary, 12th Edition, 2011

6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)

7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler

Web links

www.englishclub.com
www.easyworldofenglish.com
www.languageguide.org/english/
www.bbc.co.uk/learningenglish
www.eslpod.com/index.html
www.myenglishpages.com

Mapping of course outcomes with program outcomes

Course Title	Course Outcomes COs	Programme Outcomes(POs)											
		PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Communicative English	CO1										3		
	CO2									3			
	CO3										3		
	CO4										3		
	CO5										3		

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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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

Mapping of course outcomes with program outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					2			3						
CO2			2												
CO3		3			3										
CO4				2											
CO5	2		2						3						

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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course Code	Problem Solving And Programming		L	T	P	C
20AES0501			3	0	0	3
Pre-requisite	Basic Mathematics	Semester	I - I			

Course Objectives:

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

Course Outcomes (CO):

CO1: Able to know interconnection of peripherals and connects of algorithms and flowcharts

CO2: Able to know problem solving aspects, design and analysis of algorithm

CO3: Able to know flow control, input output and implementation functions

CO4: Able to solve computational problems using functions, array and pointers

CO5: Able to organise real world heterogeneous data and apply searching ,sorting techniques with exception handling

UNIT – I   8 Hrs

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 – II   9 Hrs

Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, and 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 – III   8 Hrs

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 – IV   9 Hrs

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

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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 kth smallest element

UNIT – V 9 Hrs
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.

Textbooks:

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.

Online Learning Resources:

www.nptel.ac.in

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2
CO1	2	2											3	
CO2	3	3	2										2	
CO3	2	3	3										2	
CO4	2	1	3	2									2	
CO5	2	1	3	3	2			2				3	2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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I-Year   **Semester:** I

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

Course Objectives:

1. Students will be exposed to a variety of self-instructional, learner friendly modes of language learning.
2. Students will learn better pronunciation through Phonetics.
3. Students will be trained to use language effectively to face interviews, group discussions, public speaking .
4. Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.

Syllabus

Unit 1

1. Phonetics
2. Non - verbal communication
3. Vocabulary (word formation, one word substitutes, words often misused & confused, collocations idioms & phrases)

Unit 2

1. Reading Comprehension
2. JAM
3. Distinction between Native and Indian English accent (Speeches by TED and Kalam).

Unit 3

1. Situational dialogues/Giving Directions
2. Describing objects/places/persons

Unit 4

1. Fun – Buzz (Tongue twisters, riddles, puzzles etc)
2. Formal Presentations

Unit 5

1. Debate (Contemporary / Complex topics)
2. Group Discussion

Course Outcomes

1. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
2. Understanding the different aspects of the language with emphasis on LSRW skills and make use of different strategies in discussions.
3. Improve words knowledge and apply skills in various language learning activities.
4. Analyze speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
5. Evaluate and exhibit acceptable etiquette essentials in social and professional presentations.

Software Source:

K-Van Solutions Software

Reference:

Teaching English - British Council

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Mapping of course outcomes with program outcomes

Course Outcomes	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		
CO2									3			
CO3										3		
CO4										3		
CO5										3		

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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(Precipitation Method)
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

Mapping of course outcomes with program outcomes

Course Outcomes	Programme Outcomes(POs) & Programme Specific Outcomes(PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				3										
CO2				3										
CO3				3										
CO4				3										
CO5				3										

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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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:

CO1: Assemble and disassembling parts of a Computer

CO2: Identify to control structure to solving the problem

CO3: Analyze different sorting algorithms

CO4: Design solutions for computational problems

CO5: 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.

Textbooks:

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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.

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.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2							2				2	
CO2	2	2	2										2	
CO3	2	2											2	
CO4	2	2	3	2									2	2
CO5	2	2	3	3	2							3	2	2

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Semester II (First year)

Sl. No.	Category	Course Code	Course Title	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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Year: I   **Semester: II**

Subject Code **20ABS9906**	Subject Name: **Differential Equations and Vector Calculus**	**L** **3**	**T** **0**	**P** **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. Evaluate the work done against a field, circulation and flux using vector calculus .

UNIT I: Linear Differential Equations of Higher Order   **9 hrs**
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.

UNIT II: Equations Reducible to Linear Differential Equations and Applications   **9 hrs**
simultaneous linear equations with constant coefficients ,Cauchy's and Legendre's linear equations, Applications to oscillations of a spring, L-C-R Circuit problems and Mass spring system.

UNIT III: Partial Differential Equations of First order and Higher Order   **9 hrs**
        Linear Equations of First order P.D.E: Method of Grouping, Method of Multipliers.
Non-linear Equations of First Order PDE: $f (p , q) = 0$, $f (z, p ,q) = 0$, $f (x , p) = F (y , q)$ and $z = px +qy + f (p , q)$ OR Clairaut's Equation.
Homogenous Linear P.D.E with constant coefficients of Higher order: Finding complementary function, Finding Particular Integrals of e^{ax+by}, Sin (ax+by) Or Cos (ax +by), $X^m Y^n$ and for any function of F (x, y). Non-Homogenous Linear P.D.E of constant coefficient

UNIT IV: Vector differentiation   **9 hrs**
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   **9 hrs**
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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Mapping of course outcomes with program outcomes

Course Outcomes	Programme Outcomes(POs) & Programme Specific Outcomes(PSOs)													
	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3													
CO2		2												
CO3	3													
CO4	3													
CO5		2												

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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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.Apply the fundamental laws of mechanics to solve engineering problems.
2. Analyze and apply the concepts of architectural acoustics and ultrasonics.
3. Analyze the properties of dielectric materials and magnetic materials for device applications.
4. Examine the types of Lasers and propagation of electromagnetic waves in optical fibers for various
   applications.
5. List the basic sensors and interpret the properties of nanomaterials for various 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 **8 Hrs**

Introduction toAcoustics – 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 toUltrasonics – Production of Ultasonic wave by magnetostriction& piezoelectric
methods –Properties-acoustic grating -Non Destructive Testing – pulse echo system through transmissionand reflection modes - A,B and C – scan displays, applications.

Unit III: Dielectric and Magnetic Materials **10 Hrs**

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 **10 Hrs**

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 offibers 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.

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Unit V: Sensors and Nanomaterials   8 Hrs

Sensors:(qualitative description only): Different types of sensors and applications; Strain Gauge, Fibre optic methods of pressure sensing;Gas sensor.

Nanomaterials–Significance of nanoscale - Physical, Mechanical, Magnetic, propertiesof nanomaterials – Synthesis of nanomaterials: Top-down-Ball Milling, Bottom-up- Sol-gel, methods –Applications of Nanomaterials.

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).

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2
CO1	3													
CO2	3													
CO3	3													
CO4	3													
CO5	3													

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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.

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

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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.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	1								2	
CO2	3	2	1	2									1	
CO3	3	1	1										1	
CO4	3	2	1	2									2	
CO5	3	1	1	2	1								2	
CO6	3	1											1	

(Levels of Correlation, viz., 1.Low, 2.Moderate, 3.High)

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Course Code		**Basics of Python Programming**	**L**	**T**	**P**	**C**
20AES0509			**3**	**0**	**0**	**3**
Pre-requisite	**NILL**	**Semester**		**II-I**		

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

Course Outcomes (CO):

CO1: Understanding the syntax and semantics of Python programming.
CO2: Apply modularity to programs.
CO3: Select appropriate data structure of Python for solving a problem.
CO4: Implement Mutable and Immutable data types
CO5: Interpret the concepts of object oriented programming as used in Python

UNIT - I 9Hrs

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 9 Hrs

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 9 Hrs

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 8 Hrs

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 10Hrs

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, Data encapsulation. **The Goodies:** Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, default dict, Named tuples, Gathering keyword

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Textbooks:
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

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2		2									
CO2	2			2									2	1
CO3	2	2	2	2									2	1
CO4	2		3		2								2	1
CO5	2	2	3		3				2				2	1

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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   Draw the projection of points and lines located in different quadrants

CO: 3   Draw the projection of planes and solids located in different quadrants.

CO: 4   Draw sectional views and develop surfaces of a given object.

CO: 5   Draw orthographic projections and Isometric projection.

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

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Mapping of course outcomes with program outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2	3	1													
CO3	3											1			
CO4	3											2			
CO5	3				3							3			

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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CIVIL ENGINEERING (CE)

Year: I   **Semester**: II

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

s: 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).

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	2	2										2	
CO2	3	2	2										2	
CO3	3	1	1										2	
CO4	3	2	2										2	
CO5	3	1	2										2	
CO6	3	1											2	

(Levels of Correlation, viz., 1.Low, 2.Moderate, 3.High)

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Year: I   **Semester**: II

Subject Code:20ABS9908	Subject Name: **Engineering Physics Lab**	L T P 0 0 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 and nanomaterials 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. Determination of crystallite size and lattice parameters using X-ray diffraction (XRD) technique.

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.
3. https://archive.nptel.ac.in/courses/112/106/112106227/

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2
CO1	3			3										
CO2	3			3										
CO3	3			3										
CO4	3			3										
CO5	3			3										

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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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

- CO1: Write, Test and Debug Python Programs
- CO2: Implement Conditionals and Loops for Python Programs
- CO3: Use functions and represent Compound data using Lists, Tuples and Dictionaries
- CO4: Read and write data from & to files in Python and develop Application using Python
- CO5: Implement the problem in terms of real world object using OOPs 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 $1/\pi$:

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

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

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

Mapping of course outcomes with program outcomes

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CO1	3	3	1	2	2								1	1
CO2	2	1	3		2								1	2
CO3	2	1	3		2								2	2
CO4	2	1	3		2								2	2
CO5	3	2	2		2				2			3	2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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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, and 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 - Panchayati raj: Introduction, PRI: Zilla Panchayat - 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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Mapping of course outcomes with program outcomes

Course Title	Course Outcomes COs	Programme Outcomes(POs)											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Constitution of India	CO1						3						
	CO2						3						
	CO3						2						
	CO4						3						
	CO5						3						

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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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	3	0	0	0		30	-	30
Total credits								21.5	370	560	930

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

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

Course Outcomes:
 CO1: Utilize the concepts of Central Tendency, Correlation, Regression concepts.
 CO2: Apply discrete and continuous probability distributions
 CO3: Inference the components of a classical hypothesis test for large samples.
 CO4: Inspect the statistical inferential methods based on small sampling tests.
 CO5: Solve the general solution of the PDEs bearing applications

Unit I: Descriptive statistics: **9 hrs**
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   **9 hrs**
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   **9 hrs**
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   **10 hrs**
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   **8 hrs**
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.

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Mapping of course outcomes with program outcomes

Course Outcomes	Programme Outcomes(POs) & Programme Specific Outcomes(PSOs)													
	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3													
CO2	3													
CO3	3													
CO4	3													
CO5		3												

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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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:
CO1: Understand the system of forces on bodies.
CO2: Determine the centroid and moment of inertia for different cross-sections.
CO3: Understand the concepts of stress, strain, generalized Hooke's law, elastic moduli
CO4: Evaluate shear force and bending moment diagrams for different load cases.
CO5: 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 2015.
2. R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd 2018.
3. R. Subramanian, Strength of Materials, Oxford University Press2013.

REFERENCES:
1. S.S. Bhavakatti, Engineering Mechanics, New Age Publishers 2015.

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Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3											1	
CO2	2	3											1	
CO3	1	3												
CO4	1	3											2	1
CO5	2	3											2	1

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Year: II   **Semester:I**

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

Course Outcomes:
CO1: Understand basic principles of surveying, Prismatic compass
CO2: Apply basic concepts of leveling, contouring and Theodolite survey in field works
CO3: Apply the concepts of computation of Areas and Volumes in earthworks
CO4: Apply the concepts of the curves and setting out in field works
CO5: 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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Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2											1	
CO2	1	3						2	1	1			2	2
CO3	2	3												
CO4	1	3						1					2	1
CO5	2											2	2	2

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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:

CO1: Understand basic characteristics and behavior of fluids

CO2: Understand concepts of fluid statics, different equipment and their applications

CO3: Understand fundamentals of fluid kinematics and differentiate types of fluid flows

CO4: Apply Euler's and Bernoulli's equation to find the characteristics of fluid in motion

CO5: Apply Energy losses in pipelines and 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 2012.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill 2014.

References:

1. N. NarayanaPillai, 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,2014.

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Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2												
CO2	1	3											2	1
CO3	2	1											1	2
CO4	1	2											1	2
CO5	1	2											1	2

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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:

CO1: Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.

CO2: Apply the Concept of Production cost and revenues for effective Business decision

CO3: Analyze how to invest their capital and maximize returns.

CO4: Evaluate the capital budgeting techniques.

CO5: 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, Profitand 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 Age International, 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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Mapping of course outcomes with program outcomes

Course Outcomes (COs)	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	**PSO1**	**PSO2**
CO1	3						1				1			
CO2	1	2												
CO3	2				1									
CO4											3			
CO5				2							2			

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: II   **Semester:I**

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

Course Outcomes:
CO1: Determine the properties of engineering materials
CO2: Solve the reactions at the supports of the simply supported beam
CO3: Determine the bending and deflection of beams with different support conditions

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.

Mapping of course outcomes with program outcomes

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		2	2	3		1	2	2
CO2	3	3				2		2	2	3		1	2	2
CO3	3	3				2		2	2	3		1	2	2

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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:

CO1: Determine area of closed boundary using chain surveying and plane table surveying.

CO2: Determine angles using theodolite surveying and compass surveying.

CO3: Determine height, area and level difference using total station and fly levelling.

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

   Mapping of course outcomes with program outcomes
   (Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		2	2	3		2	2	2
CO2	3	3				2		2	2	3		2	2	2
CO3	3	3				2		2	2	3		3	3	3

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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 factorin pipes
   4. 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

Mapping of course outcomes with program outcomes

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		2	2	3		1	1	1
CO2	3	3				2		2	2	3		1	1	1
CO3	3	3				2		2	2	3		1	1	1
CO4	3	3				2		2	2	3		2	2	2

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Year II   **Semester I**

Subject Code	Subject Name	L	T	P	Credits
20APC0107	**Basics of CAD**			**3**	**0**

Course Outcomes:
1. **Understand the tools of CAD Software**
2. **Understand of concept of co-ordinate methods**
3. **Understand the isometric views**

S.No	Title of the Experiment
EX-1	INTRODUCTION TO COMPUTER AIDED DESIGN
EX-2	ABSOLUTE CO – ORDINATE METHOD
EX-3	RELATIVE CO – ORDINATE METHOD
EX-4	POLAR CO – ORDINATE METHOD
EX-5	CO-ORDINATE METHOD
EX-6	ISOMETRIC VIEW -1
EX-7	ISOMETRIC VIEW -2
EX-8	ISOMETRIC VIEW -3
EX-9	ISOMETRIC VIEW OF ONE BRICK WALL ENGLISH BOND
EX-10	ISOMETRIC VIEW OF ONE BRICK WALL FLEMISH BOND

Mapping of course outcomes with program outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	P0 11	PO 12	PS01	PS02
C01	3				3								3	
C02	3				3								3	
C03	3				3								3	

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Year: II   **Semester: I**

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

Course Outcomes:
CO1: Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
CO2: 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.
CO3: 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.
CO4: Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
CO5: 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

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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.

Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2					1					1		
CO2		3					2							
CO3		3			2							1		
CO4		2												
CO5					3		2					1		

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CIVIL ENGINEERING (CE)

Semester IV (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of 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	2	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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Year: II   **Semester: II**

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

Course Outcomes:

CO1: Analyze about the classifications and stages of mathematical modelling.

CO2: Identify building of mathematical models.

CO3: Evaluate the behaviour of mathematical models.

CO4: Determine a linear programming problem and solve it by various methods.

CO5: Apply the 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.

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 MajidJaberi-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

Mapping of course outcomes with program outcomes

Course Outcomes	Programme Outcomes(POs) & Programme Specific Outcomes(PSOs)													
	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		3												
CO2		3												
CO3		3												
CO4		3												
CO5		3												

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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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:
CO1: Apply concept of the simple bending in beams
CO2: Apply concept of the shear stresses in beam and combined stresses in columns
CO3: Apply concept of crippling load theory in axially loaded compression members
CO4: Apply concept of pure torsion in circular shafts
CO5: Apply concept of principal stresses and various failure theories in structural members

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, EngineeringMechanics, Lakshmi Publications,2015.
R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd,2015.
R. Subramanian, Strength of Materials, Oxford University Press,2016.

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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Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2												1
CO2	2	2												1
CO3	2	3												1
CO4	1	2												1
CO5	1	2												1

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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:

CO1: Understand Laminar Flow and Turbulent flow through pipes

CO2: Compute the uniform flowsin open-channel flow systems.

CO3: Compute the Non-uniform flows in open-channel flow systems.

CO4: Evaluate the performance of impact of jets onplates and its application in different turbines.

CO5: Determine the performance 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 ,2015.

2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria& Sons 2014.

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.

Mapping of course outcomes with program outcomes

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2												1
CO2	2	2												1
CO3	2	2												1
CO4	2	3	1										1	2
CO5	1	2											1	2

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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:
CO1: Analyze fixed beam with yielding of supports
CO2: Analyze beams using slope deflection method
CO3: Analyzebeams using moment distribution methods
CO4: Apply energy theorems for analysis of indeterminate structures
CO5: Analyzedeterminate 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", DhanpatRai 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

Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3						1				1	2	2
CO2	1	3						1				1	2	2
CO3	1	3						1				1	2	2
CO4	2	3						1				1	2	2
CO5	1	3						1				1	2	2

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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:

CO1: Understand various ingredients of concrete and their role.

CO2: Determine the fresh, hardened and engineering properties of concrete.

CO3: Understand non-destructive testing methods of testing concrete.

CO4: Understand the durability problems and remedial measure in the concrete.

CO5: Design of concrete mixes using Indian Standard method.

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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Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2											1		2
CO2	2	1	1	1	1	1	1	1				1		1
CO3	2	1	1	1	1	1	1	1				1		2
CO4	1	1	1	2	2	1	1	1				1	1	2
CO5	2	2						2				1	1	2

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Year: II   **Semester: II**

Subject Code 20AHS9905	Subject Name Universal Human Values	L T P 2 1 0	Credit: 3

Course Outcomes:
On completion of this course, the students will be able to
CO1: Students are expected to become more aware of themselves, and their surroundings *(family, society, nature)*
CO2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO3: They would have better critical ability.
CO4: They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
CO5: 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.

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

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- 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.

 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. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, 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

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7. J C Kumarappa "Economy of Permanence"
8. PanditSunderlal "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 - RomainRolland(English)
13. Gandhi - Romain Rolland (English)

Mapping of course outcomes with program outcomes

Course Outcomes COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1								3				
CO2								3				
CO3								3				
CO4								3				
CO5								3				

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: II　　　　　　　　　　　　　　　　　　　　　　　　　　**Semester: II**

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

Course Outcomes:

1. Determine minor losses in pipes
2. Determine the 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)

Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		2	2	3		2	2	2
CO2	3	3				2		2	2	3		2	2	2
CO3	3	3				2		2	2	3		2	2	2

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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:

CO1. Determine the properties of cement and aggregate as per IS specifications.

CO2: Determine the properties of fresh and hardened concrete as per IS specifications.

CO3: Demonstrate the strength of concrete using Non-Destructive testing on concrete.

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)

Mapping of course outcomes with program outcomes

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1				2		2				2	2	2
CO2	2	1				2		2				2	3	3
CO3	2	1				2		2				2	3	3

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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:
CO1: Understand the concepts and basics of CAD
CO2: Draw and develop plan, elevation and section for single and multi storey buildings.
CO3: Detailing of components for buildings.

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

Mapping of course outcomes with program outcomes
(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		2	2	3		2	2	2
CO2	3	3				2		2	2	3		2	2	2
CO3	3	3		2	2	2		2	2	3		2	2	2

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Year: II   **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APC0115	**Land survey with 2D drafting /Soft skills**	1	0	2	2

COURSE OUTCOMES:

1. Understand basic concepts of total station

2. Understand modern techniques in the survey systems.

3. Understand the concepts and basics of CAD and 2D Drafting

LIST OF EXPERIMENTS:

1. Total Station:

    Determination of Area, Contour maps, Levelling and Setting out of curves.

2. Demonstration on GPS (Global Positioning System)

3. Introduction to Land Surveying

4. Drawing of Irregular Plan in Auto Cad Software

5. Determination of Area of given Plans in Auto Cad software (Boundary Survey)

6. Drawing of site plan in Auto Cad Software (Construction Survey)

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1		2		2	2	3		2	2	2
CO2	3	3	3	1		2		2	2	3		2	2	2
CO3	3	3	3	1		2		2	2	3		3	3	3

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Semester V (third year)

Sl. No.	Category	Course Code	Course Title	L	T	P	C	CIE	SEE	Total
1	Professional core course	20APC0116	Soil Mechanics	3	0	0	3	30	70	100
2	Professional core course	20APC0117	Building Technology	3	0	0	3	30	70	100
3	Professional core course	20APC0118	Engineering Geology	3	0	0	3	30	70	100
4	Open Elective course / Job Oriented Elective	20APE0417	Sensor Networks	3	0	0	3	30	70	100
		20APC0323	Operations Research							
		20AOE0302	Management Science							
5	Professional Elective courses	20APE0101	Structural Analysis-II	3	0	0	3	30	70	100
		20APE0102	Water Harvesting and Conservation							
		20APE0103	Cost Effective Housing Techniques							
6	Professional core courses (LAB)	20APC0119	Soil Mechanics Lab	0	0	3	1.5	30	70	100
7	Professional core courses (LAB)	20APC0120	Engineering Geology Lab	0	0	3	1.5	30	70	100
8	**Skill Oriented Course***	20APC0121	Building planning & Drawing Lab	1	0	2	2	100	-	100
9	Mandatory course (AICTE suggested)	20AMC9904	Professional Ethics and Human Values	3	0	0	0	30	-	30
10	**CSP**	20CSP0101	Community service project	0	0	0	1.5	100	-	100
Total credits							**21.5**	**440**	**490**	**930**
Honors/ Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4**	**30**	**70**	**100**

S. No	Professional Electives*	Open Electives*
1	Air Pollution and Control	An introduction to Artificial intelligence
2	Basic construction materials	Industrial Safety Engineering
3	Pavement Materials	Leadership and Team Effectiveness
4	Energy Efficiency, Acoustics and Day lighting in Building	Education for Sustainable Development
5	Remote Sensing Essentials	Organizational Behavior
6	Ground Improvement	Environment and Development
7	Availability And Management Of Groundwater Resources	Indian Art: Materials, Techniques And Artistic Practices
8	Integrated Waste Management For A Smart City	Human Resource Development
9	Sustainable Transportation Systems	Entrepreneurship
10	Bridge Engineering	Geographic Information System
11	Municipal Solid Waste Management	Patent Law for Engineers and Scientists
12	Admixtures And Special Concretes	Training and Development
13	Characterization of Construction Materials	Talent Acquisition and Management
14	Soil Structure Interaction	Principles of Management
15	Water Supply Engineering	E-Business

*Student shall register any number of MOOC courses listed above (Professional/ Open) by the department as approved by the BOS. But student is required to submit the pass certificate on NPTEL platform for at least one course with in the Programme duration (Before IV-II examination notification).

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Year: III			**Semester:I**			
Subject Code	**Subject Name**	**L**	**T**	**P**	**Credits**	
20APC0116	**Soil Mechanics**	**3**	**0**	**0**	**3**	

Course Outcomes: At the end of the course the student will able to

CO1: Understand soil formation and determine the index properties of soil

CO2: Determine the coefficient of permeability and effective stress

CO3: Estimate stresses under various loading conditions and compaction characteristics.

CO4: Analyze the compressibility of the soils

CO5: Understand the strength of soils under various drainage conditions

UNIT – I
Introduction: Soil formation– Mass, volume relationships–moisture content – Specific Gravity-Field density by core cutter and sand replacement methods-Relative density.
Index Properties of Soils: Grain size analysis – consistency limits and indices – I.S. Classification of soils.
UNIT –II
Permeability: Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting permeability – laboratory determination of coefficient of permeability-layered permeability.
Effective Stress: Total, neutral and effective stresses – principle of effective stress - quick sand condition — Flow-nets: Characteristics and Uses.
UNIT –III
Stress Distribution in Soils: Boussinesq's and Westergaard's theories for point load, uniformly loaded pressure bulb and Newmark's influence chart.
Compaction: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.
UNIT – IV
Consolidation: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil – coefficient of consolidation: square root time and logarithm of time fitting methods.
UNIT - V
Shear Strength of Soils: Importance of shear strength – Mohr's– Coulomb Failure theories – Direct shear test, Un-confined compressive strength and vane shear test– strength tests based on drainage conditions - critical void ratio

TEXT BOOKS:
1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Basic and Applied Soil Mechanics by GopalRanjan& ASR Rao, New age International Pvt Ltd
3. Soil Mechanics and Foundation by by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
4. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
5. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd, (2002).

REFERENCE BOOKS:
1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
2. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers.
3. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
4. Geotechnical Engineering by ManojDutta&Gulati S.K – Tata McGraw-Hill Publishers New Delhi.

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Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2											2	2
CO2	3	2											1	3
CO3	3	3											1	2
CO4	3	3											2	2
CO5	3	2											1	3

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III   **Semester:I**

Subject Code	Subject Name	L	T	P	Credits
20APC0117	**BUILDING TECHNOLOGY**	**3**	**0**	**0**	**3**

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

CO1: Classify and understand the applications of basic building materials.

CO2: Understand the applications of advanced building materials

CO3: Understand the principles and methods of building construction components

CO4: Understand the building services and principles of building planning.

CO5: Apply bye-laws and regulations in planning Residential buildings

UNIT I
BASIC BUILDING MATERIALS:
BRICKS: Composition of good brick earth – Methods of manufacturing of bricks– comparisonbetween clamp burning and kiln burning – Testing of bricks.
WOOD: Seasoning of timber – Defects in timber.
OTHER MATERIALS: Properties and uses of glass, plastics, steel, aluminum, bitumen.
UNIT - II
ADVANCED BUILDING MATERIALS:
NANO MATERIALS: Introduction – Types and its applications.
SMART MATERIALS: Introduction - Types of smart materials and its applications.
MODERN BUILDING MATERIALS: Building products made of gypsum and their uses- GFRG.
UNIT – III
BUILDING CONSTRUCTION:
MASONRY: Bonds in brick masonry – Cavity& Partition walls.
FLOORS: Different types of floors – concrete, mosaic, terrazzo, tiled floors.
STAIRS: Terminology – Types of stairs.
SURFACE FINISHES: Plastering – Pointing – White washing, distempering and Painting – Damp proofing - Form work and scaffolding.
UNIT – IV
BUILDING SERVICES:
PLUMBING SERVICES: Different types of pipes – Pipe fitting.
PRINCIPLES OF BUILDING PLANNING: Introduction – Selection of site – Aspect, prospect, roominess, grouping, circulation, privacy, sanitation, elegance, economy, flexibility and practical considerations.Lighting and ventilation requirements.
UNIT – V
BUILDING BYE–LAWS AND REGULATIONs*:* Introduction – Objectives of building bye-laws – Principles underlying building bye-laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) – Classification of buildings – Open space requirements – Built up area limitations – Height of the buildings – Wall thickness
PLANNING OF RESIDENTIAL BUILDINGS: Introduction – Minimum standards for various parts of the buildings – Bed room – Kitchen – Dining room – Bath room – Water closet.

TEXT BOOKS:
1. Dr. N. Kumara Swamy& A. KameswaraRao, Building Planning & Drawing, Charotar
Publishers, Anand.
2. Dr. B.C. Punmia [2008], *Building construction*, Laxmi Publications (P) Ltd., New Delhi
3.Gurucharan Singh and Jagdish Singh [2009], *Building Planning Designing and*
scheduling, Standard publishers Distributors

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REFERENCES:
 1. S.K. Duggal [2012], *Building materials*, New Age international (P) Ltd., New Delhi.
 2. Bureau of Indian Standards, *National Building Code of India – 2005*, New Delhi.
 3. M. Chakraborty, Civil Engineering Drawing, Third Edition, Bhakti Vedanta Book Trust.
 4.S.C. Rangwala [2009], *Civil Engineering Drawing*, Charotar Publishing House

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3												1	1
CO2	3												2	1
CO3	3												1	1
CO4	3					2		2					2	2
CO5	3					2		2					2	2

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Year: III   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APC0118	**Engineering Geology**	**3**	**0**	**0**	**3**

Course Outcomes: At the end of the course the student will able to

CO1: Understand principles of engineering geology.

CO2: Understand properties of various rocks and minerals

CO3: Understand the suitability of sites for various civil engineering structures.

CO4: Understand geological strata in the analysis and design the civil engineering structures.

CO5: Understand the concept of remote sensing and GIS.

UNIT – I

Introduction:

Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition. Weathering, erosion and denudations process on earth material and natural agencies, Geological work of wind, river underground water and glaciers Mineralogy: Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group; Feldspar Group; Kaolin; Asbestos; Carbonate Group ; Gypsum; Mica Group; Ore minerals - Iron ores; pyrite; Chlorite

UNIT – II

Petrology:

Definition of rock - Rock forming processes - Geological classification of rocks - Dykes and sills, common structures and textures - Megascopic study, Chemical and Mineralogical Composition of rock (Granite, Gabbro, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Tuff, Felsite, Gneiss, Schist, Quartzite, Breccia, Marble, Porphyries, Charnockite and Slate).

UNIT – III

Structural Geology:

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT –IV

Geomorphology, hydrogeology and seismology:

Ground water, Water table - ground water exploration.site selection for dams and tunnels – analysis of failures in dams and tunnels - Seismic zones of India - Earth quakes, their causes and effects. Seismic waves, Richter scale. Landslides - causes and effects; Tsunami –causes and effects.

UNIT – V

REMOTE SENSING :

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.

GEOGRAPHIC INFORMATION SYSTEM:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS.

TEXT BOOKS:
1. Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2. Engineering Geology by VasudevKanthi, Universities Press, Hyderabad.
3. Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi

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Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2											1	1
CO2	2	1											1	2
CO3	2	2											1	2
CO4	2	2	1										2	2
CO5	2	2	1										1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III **Semester: I**

Course Code	Course Title	L	T	P	Credits
20APE0417	Sensor Networks	3	0	0	3

Course Outcomes: Students will be able to
CO1. Understand the concepts of Converters and **Sensor data acquisition systems**
CO2: Understand the concepts of Sensor Measurements in Structural Monitoring
CO3: Understand the concepts of commonly used sensing technologies and algorithms
CO4: Understand the concepts of **piezoelectric transducers for assessing and monitoring infrastructures**
CO5: Understand the concepts of **Fiber optic sensors for assessing and monitoring infrastructures**

Unit-1 Sensor data acquisition systems and architectures
Introduction, General measurement system, Analog-to-digital converter architectures-Different types of ADCs – parallel comparator type ADC, Counter type ADC, successive approximation ADC and dual slope ADC Digital-to-Analog conversion-Basic DAC techniques, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Data acquisition systems-Analog Systems-Digital Systems

Unit-II Sensors and Sensing Technology for Structural Monitoring
Introduction, Sensor Types, Sensor Measurements in Structural Monitoring- Structural Responses-Environmental Quantities- Operational Quantities- Typical Quantities for Bridge Monitoring- Fibre Optic Sensors- Classification of Fibre Optic Sensors- Typical Fibre Optic Sensors in SHM- Fibre Optic Sensors for Structural Monitoring- Wireless Sensors- Components of Wireless Sensors- Field Deployment in Civil Infrastructure-Case Study

Unit-III Commonly used sensors for civil infrastructures and their associated algorithms
Introduction, commonly used sensing technologies- Displacement-Strain-Acceleration-Environment-Prevalence of commonly used sensors in SHM systems- **Associated algorithms-** Displacement sensors- Strain gages- Accelerometers- Environmental measurements- **Examples of continuous monitoring systems**

Unit-IV Piezoelectric transducers for assessing and monitoring civil infrastructures
Introduction, Principle of piezoelectricity, Piezoelectric materials and the fabrication of piezoelectric transducers, Piezoelectric transducers for SHM applications, Bonding effects, Limitations of piezoelectric transducers, SHM techniques using piezoelectric transducers

Unit-V Fiber optic sensors for assessing and monitoring civil infrastructures
Introduction, Optical fiber concepts, Sensing mechanisms, Sensor packaging, Cables, connectors, and splicing, **Common optical fiber sensors-** Coherent interferometers, Low-coherence interferometers, Fiber Bragg gratings, Brillouin and Raman scattering distributed sensors

Text Books:
1. "Sensor Technologies for Civil Infrastructures", Volume 1 Sensing Hardware and Data Collection Methods for Performance Assessment Woodhead Publishing in Civil and Structural Engineering Ming L. Wang Jerome P. Lynch Hardcover ISBN: 9780857094322
2. "Wireless Sensor Networks for Civil Infrastructure Monitoring: A Best Practice Guide" ICE Publishing David Rodenas-Herráiz, Kenichi Soga, Paul R A Fidler and Nicholas de Battista

References:
1. Ghatak A and Thyagarajan K. (1998) Introduction to Fiber Optics; Cambridge University Press: Cambridge, UK.
2. Barthorpe, R.J. and Worden, K. (2009) Sensor Placement Optimization. *Encyclopaedia of Structural Health Monitoring*, Boller, Chang and Fujino (ed.), John Wiley & Sons, Chichester, UK.

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Mapping of course outcomes with program outcomes

Course Title	Course Outcomes (COs)	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	**PSO 1**	**PSO2**
Sensor Networks	CO1	**3**				**2**								2	
	CO2	**2**		3	3									2	
	CO3	**2**		3										3	
	CO4	2			2	3								2	
	CO5	3				2								3	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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

Subject Code	Subject Name	L	T	P	Credits
20APC0323	**Operations Research**	**3**	**0**	**0**	**3**

Course Outcomes:
CO: 1　Understand Basics of operations research and solve linear programming problems
CO: 2　Solve Transportation and assignment problems
CO: 3　Solve game and replacement problems
CO: 4　Solve the sequencing related problems
CO: 5　Solve queuing problems and other relevant problems using simulation tool

UNIT I
Introduction to OR and Linear Programming-1 OR definition– Classification of Models –Types of Operations Research models; Linear Programming- Problem Formulation, Graphical Method, Simplex Method, Two–Phase Simplex Method, Big-M Method Special Cases of LP- Degeneracy, Infeasibility and Multiple Optimal Solutions.

UNIT II Linear programming-2: Transportation Problem – Formulation; Different Methods of Obtaining Initial Basic Feasible Solution- North-West Corner Rule, Least Cost Method, Vogel's Approximation Method; OptimalityTesting. Special Cases -Unbalanced Transportation Problem, Degenerate Problem; Assignment Problem – Formulation; Optimal Solution -Traveling Salesman problem.

UNIT III Game Theory: Introduction – Minimax (Maximin) Criterion and Optimal Strategy, Saddle Point, Solution of Games with Pure Strategy –Games with Mixed Strategies– Dominance Principle–Graphical Method, Algebraic methods, sub matrices method.

UNIT IV
Queuing Theory: Introduction –Terminology, Service Channel, Arrival Pattern, Population, Departure Pattern (Service Pattern), Queue Discipline Single Channel Models with Poisson Arrivals, Exponential Service Times with finite queue length and non-finite queue length; Multichannel Models with Poisson Arrivals, Exponential Service Times with finite queue length and non-finite queue length.
Sequencing -Assumptions-n-jobs-2 Machines model, n-jobs-3-machines models & n jobs – m Machines models.

UNIT V Dynamic Programming: Introduction – Bellman's Principle of Optimality – Applications of Dynamic Programming- Capital Budgeting Problem – Shortest Path Problem – Solution of Linear Programming Problem by DP.
Replacement Models: Introduction –Types of Replacement Problem, Determination of Economic Life of an Asset, and Simple Probabilistic Model for Items which completely fail-Individual Replacement Model, Group Replacement Model.

Text Books:
1. Operations Research, Dr. C.Nadhamuni Reddy & Sri Gopal Krishna, Kurnool Publishers
2. Operation Research, J.K.Sharma,MacMilan, 5th edition, 2013.
3. Introduction to Operations Research, H.A.Taha, PHI, 9th edition, 2013

Reference Books:

1. Operations Research, A.M.Natarajan,P.Balasubramani,A. Tamilarasi,Pearson Education, 8th edition, 2011
2. Operations Research by R Panneerselvam, PHI, 2nd edition, 2012.
3. Operations Research, Wagner, PHI Publications , 2nd edition.
4. Operations Research, S.R.Yadav, A.K.Malik, Oxford, 2015

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Mapping of course outcomes with program outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2					2								
CO2		3							1						
CO3		2									2				
CO4		2		1											
CO5		3									2				

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| Year: III | Semester : I | | Branch of Study : Common to all | | |

Subject Code	Subject Name	L	T	P	Credits
20AOE0302	**Management Science**	**3**	**0**	**0**	**3**

Course Outcomes:

CO: 1   Exercise critical thinking to propose, communicate, and implement, action plan that address opportunities and issues.

CO: 2   Identify and utilize ethical and legal standards in psychology while taking into account all relevant stakeholders.

CO: 3   Observe and recognize behaviours in organizational settings to aid in predicting outcomes.

CO: 4   Appreciate the importance of time management, planning, and communication in completing a group project.

CO: 5   Integrate knowledge of the key theories across the disciplines of public administration.

UNIT I

Introduction to Management:

Management - Concept - Nature - Functions – Levels - Evolution of Management Thought - Taylor's Scientific Theory - Henry Fayol's principles - Elton Mayo's Human relations - Leadership styles - Autocratic leadership - Democratic & Free rein leadership.

Organizational Designs: Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization.

UNIT II

Operations Management:

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study. **Material Management** - Objectives – Inventory classification - Inventory Techniques - EOQ-ABC Analysis

Marketing Management: Concept - Meaning - Nature- Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

UNIT III

Human Resources Management (HRM):

HRM - Definition and Meaning - Managerial and Operative functions - Evolution of HRM - Job Analysis & Job Evaluation - Human Resource Planning (HRP) Process/Procedure- Employee Recruitment Process - Employee Selection Process and Tests in Employee Selection - Employee Training and Development - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration

UNIT IV

Strategic Management:

Definition & Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - SWOT Analysis

Project Management - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simple problems).

UNIT V

Contemporary Management:

The concept of Management Information System (MIS) - Materials Requirement Planning (MRP) - Customer Relations Management (CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain

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Management (SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking - Balanced Score Card.

Textbooks:

1. A.R Aryasri, "Management Science", TMH, 2013

2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

References:

1. Koontz &Weihrich, "Essentials of Management", 6th edition, TMH, 2005.

2. Thomas N.Duening& John M.Ivancevich, "Management Principles and Guidelines", Biztantra.

3. KanishkaBedi, "Production and Operations Management", Oxford University Press, 2004.

Mapping of course outcomes with program outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1								2					
CO2						2		2		1					
CO3	2				2										
CO4								1		2	3				
CO5						3				3					

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III   **Semester:I**

Subject Code	Subject Name	L	T	P	Credits
20APE0101	**Structural Analysis - II**	**3**	**0**	**0**	**3**

Course Outcomes: At the end of the course the student will able to

CO1: Analyse the three hinged arches for different loading

CO2: Analyse the frames using slope deflection and moment distribution method

CO3: Analyse the beams and frames using Kani's method

CO4: Analyse the beams using flexibility & stiffness method

CO5: Analyze the beams using plastic analysis

UNIT –I

ARCHES : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

UNIT – II

SLOPE-DEFLECTION & MOMENT DISTRIBUTION METHOD: Analysis of single bay, single storey, portal frame including side sway– Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway.

UNIT - III

KANI`S METHOD: Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

UNIT –IV

FLEXIBILITY & STIFFNESS METHODS: Flexibility methods, Introduction, application to continuous beams including support settlements-Introduction to stiffness method and its application application to continuous beams including support settlements.

UNIT – V

PLASTIC ANALYSIS: Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS:

1. S.S. Bhavikatti, "Structural Analysis", Volume 1 and 2, Vikas Publishing House, Pvt. Ltd.

2. S. Ramamurtham, "Theory of Structures", DhanpatRai 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

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3											1	3
CO2	1	3											2	3
CO3	1	3											2	3
CO4	2	3											2	3
CO5	2	3											2	3

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III   **Semester:I**

Subject Code	Subject Name	L	T	P	Credits
20APE0102	**Water Harvesting and Conservation**	3	0	0	3

Course Outcomes: At the end of the course the student will able to

CO1: Appreciate the importance of movement of ground water

CO2: Understand the methods of Water Harvesting

CO3: Understand water recovery and reuse

CO4: Understand the principles of Watershed Management and its importance in sustainability

CO5: Understand soil and water conservation

UNIT – I

Origin, Occurrence & Movement of Groundwater:-Introduction-sources of ground water – Hydro geological Cycle – Infiltration – natural openings in rocks – zones of aeration , saturation and water table – classification of ground water – laboratory and field methods of sampling ground water- aquifers – aquifuges- aquicludes – aquitards – ill effects due to lowering of water table -Artificial recharge.

UNIT – II

Water Harvesting: Principles of water harvesting-methods of rainwater harvesting-design of rainwater harvesting structures-Purification Techniques for direct use- Harvesting of surface runoff-onsite detention basin - ponds - types - Recycling of harvested water

UNIT – III

Water Recovery and Reuse: Perspective on recycle and reuse-factors affecting the development of water reclamation and reuse criteria- elements/components of water reclamation and reuse criteria / guidelines- sewage irrigation- Waste water reclamation-waste water recharge for reuse – Treatment Requirements for Water Reuse-methods.

UNIT – IV

Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed- Introduction to watershed management- Integrated water resources management- natural resources management-agricultural practices-integrated farming-Conjunctive use of water resources-Community participation-Watershed Management Practices in Arid and Semiarid Regions-Case studies-Short term and long term strategic planning.

UNIT – V

Soil and Water Conservation: Scope of soil and water conservation-Mechanics and types of erosion-their causes-Soil erosion control measures - bank protection-vegetative barriers-contour bund- contour trenches- contour stone walls-contour ditches-terraces-outlets and grassed waterways-Gully control structures - temporary and permanent - design of permanent soil conservation structures-Design of farm ponds and percolation ponds.

Text books:
1. Watershed Management by Murty, J.V.S, New Age Intl., New Delhi .
2. Water Resources Conservation and Management by Chatterjee, S. N.,Atlantic Publishers.
3. Ground Water by S.Ramakrishnan, SCITECH Publishers.

Reference books:

Advances in Soil and Water Conservation by Pierce, F.J. and Frye, W. W. (1998):, Ann Arbor Press, Michigan

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Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												1	1
CO2	3												1	1
CO3	3												1	1
CO4	3												1	1
CO5	3												1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0103	**Cost Effective Housing Techniques**	**3**	**0**	**0**	**3**

Course Outcomes: At the end of the course the student will able to

CO1: Apply the concept of housing techniques.

CO2: Understand housing programmes and projects.

CO3: Understand development and adoption of low cost housing technology

CO4: Understand low cost housing in rural areas

CO5: Understand housing in disaster prone areas

UNIT – I:-p

Introduction to Housing: Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy, Principle of Sustainable Housing – Integrated approach on arriving holding capacity and density norms - All basic infrastructure consideration - Institutions for Housing at National, State and Local levels.

UNIT – II:-

Housing Programmes: Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods- Plotted land development programs, Open Development Plots, Apartments, Gated communities, Townships, Rental Housing, Co-operative Housing, Slum Housing Programmes – Slum improvement – Slum redevelopment and Relocation – Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies, and Private sector in supply , quality, infrastructure and pricing – Role of Non-Government Organizations in slum housing.

UNIT – III:-

Development And Adoption Of Low Cost Housing Technology: Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements - Adopting of total prefabrication of mass housing in India- General remarks on pre cast rooting/flooring systems -Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall - Fly ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT – IV:-

Alternative Building Materials for Low Cost Housing and Infrastructure Services in Rural Houses: Introduction - Substitute for scarce materials – Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Low cost Infrastructure services:Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy.RuralHousing:Introduction traditional practice of rural housing continuous - Mud Housing technology-Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing program

UNIT – V:-

Housing in Disaster Prone Areas: Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirement's of structural safety of thin pre-cost roofing units against Earthquake forces -Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety

TEXT BOOKS

1. Hand book of Low Cost Housing by A.K.Lal – New Age International publishers.
2. Low Cost Housing – G.C. Mathur, IBH Publishers.
3. Housing in India by Francis Cherunilam and Odeyar D Heggade, Himalaya Publishing House, Bombay, 1997.

REFERENCES:-

1. Disaster Management by Rajib Shaw, Universities Press, India.
2. Disaster Science and Management by Tushar Bhattacharya, TMH Publications.

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3. Building Materials For Low –Income Houses – International Council For Building Research Studies And Documentation.
4. Modern Trends In Housing In Developing Countries – A.G. MadhavaRao, D.S. Ramachandra Murthy &G.Annamalai.
5. Properties of Concrete – Neville A.M. Pitman Publishing Limited, London.
6. Light Weight Concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												1	1
CO2	3												1	1
CO3	3												1	1
CO4	3												1	1
CO5	3												1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III   **Semester:I**

Subject Code	Subject Name	L	T	P	Credits
20APC0119	Soil Mechanics Lab	0	0	3	1.5

Course Outcomes: On the completion of the course, the students will be able to:
CO1: Determine the index properties of soils
CO2: Determine the coefficient of permeability of soils
CO3: Determine the Engineering Properties and Swelling Characteristics of soils

LIST OF EXPERIMENTS

1. Determination of Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
2. a) Determination of Field density by core cutter method and
   b) Determination of Field density by sand replacement method
3. Determination of Specific gravity of soil
4. Determination of Grain size distribution by dry sieve analysis
5. Determination of Coefficient of Permeability of soil by constant and variable head test methods
6. Determination of OMC & MDD by Standard Proctor's Compaction Test
7. Determination of California Bearing ratio test
8. Determination of Unconfined compression test
9. Determination of Cohesion and internal friction by Direct shear test
10. Determination of Free swell index (FSI) test

REFERENCES:
Measurement of Engineering Properties of Soils by. E. Saibaba Reddy & K. Rama Sastri, New Age International

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2						2	2	1			2	2
CO2	2	3						2	2	1			2	2
CO3	2	3						2	2	1			2	2

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Year: III   **Semester:I**

Subject Code	Subject Name	L	T	P	Credits
20APC0120	**Engineering Geology Lab**	**0**	**0**	**3**	**1.5**

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

CO1: Study of physical properties and identification of minerals referred under theory.

CO2: Megascopic description and identification of rocks referred under theory.

CO3: Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.

CO4: Simple Structural Geology problems.

LIST OF THE EXPERIMENTS

1. Description and identification of SIX minerals

2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)

3. Interpretation of a Geological map along with a geological section.

4. Simple strike and Dip problems.

TEXT BOOKS:-
   1. Elementary Exercises in Geology by CVRK Prasad, Universities press.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1				1		2		2			1	1
CO2	2	2				1		2		1			1	1
CO3	2	2				1		2		2			1	2
CO4	2	2				1		2		2			1	2

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Year: III   **Semester:I**

Subject Code	Subject Name	L	T	P	Credits
20APC0121	Building planning & Drawing Lab	1	0	2	2

COURSE OUTCOMES:
CO1. To understand the NBC building guidelines for planning and developing design
CO2. To develop the geometric forms through plans and elevations
CO3.To prepare the bar bending schedule for the structural elements in the building

LIST OF EXPERIMENTS:
1. General building requirements

2. 3D-Single storey Residential building

3. 3D-Two storey educational building

4. Reinforcement Drawing: Typical Beams

5. Reinforcement Drawing: Typical Columns

6. Reinforcement Drawing: Typical Slabs

Mapping of course outcomes with program outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											1
CO2			3		2							1
CO3			3		2	2						1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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B.Tech III Year   Semester: I   Branch of Study: Common to all
MANDATORY COURSE

Subject Code 20AMC9904	Subject Name Professional Ethics And Human Values	L 3	T 0	P 0	Credits: 0

Course Outcomes:

CO1: It ensures students sustained happiness through identifying the essentials of human values and skills.
CO2: The students will understand the importance of Values and Ethics in their personal lives and professional careers.

CO3: The students will learn the rights and responsibilities as an employee, team member and a global citizen.

CO4: Students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.

CO5: Students can able to develop appropriate technologies and management patterns to create harmony in professional and personal life.

UNIT - I: 12hrs

Introduction to Human Values: Need, basic Guidelines, Content and Process for Value Education, Self Exploration - 'Natural Acceptance' and Experiential Validation. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities. Understanding Happiness and Prosperity correctly.

UNIT - II: 12hrs

Understanding Harmony in the Family and Society: Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the harmony in the society (society being an extension of family). Visualizing a universal harmonious order in society - Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha) - from family to world family!

UNIT – III: 12hrs

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT – IV: 15hrs

Professional Practices in Engineering: Work Place Rights & Responsibilities, Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers – The Centrality of Responsibilities of

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Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – V: **12hrs**

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Depletion, Pollution, Ethics in Manufacturing and Marketing, Media Ethics, War Ethics, Bio Ethics, Intellectual Property Rights.

Text Books:

1.R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

2.Professional Ethics: R. Subramanian, Oxford University Press, 2015. 3.Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

Reference Books:
1.Prof. K. V. SubbaRaju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.
2.Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA 3.Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S PritchaMichael J Rabins, 4e , Cengage learning, 2015.
4.Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

Mapping of course outcomes with program outcomes

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1								3				
CO2								3				
CO3								3				
CO4								3				
CO5								3				

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Semester VI (third year)

Sl. No.	Category	Course Code	Course Title	L	T	P	C	CIE	SEE	Total
									Hours per week / Credits / Scheme of Examination (Max. Marks)	
1	Professional core course	20APC0122	Environmental Engineering	3	0	0	3	30	70	100
2	Professional core course	20APC0123	Highway Engineering	3	0	0	3	30	70	100
3	Professional core course	20APC0124	Foundation Engineering	3	0	0	3	30	70	100
4	Professional Elective courses	20APE0104	Design and Drawing of Reinforced concrete Structures	3	0	0	3	30	70	100
		20APE0105	Intelligent Transport System							
		20APE0106	Remote Sensing and GIS							
5	Professional core courses (LAB)	20APC0125	STAAD Lab	0	0	3	1.5	30	70	100
6	Professional core courses (LAB)	20APC0126	Environmental Engineering lab	0	0	3	1.5	30	70	100
7	Professional core courses (LAB)	20APC0127	Highway Engineering Lab	0	0	3	1.5	30	70	100
8	**Skill Oriented Course***	20AHE9902	Principles of effective public speaking	1	0	2	2	100	-	100
9	Mandatory course (AICTE suggested)	20AMC9901	Biology for Engineers	3	0	0	0	30	-	30
	Total credits						**18.5**	**340**	**490**	**830**
	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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Year: III   **Semester:II**

Subject Code	Subject Name	L	T	P	Credits
20APC0122	**ENVIRONMENTAL ENGINEERING**	**3**	**0**	**0**	**3**

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

CO1: Identify the water demand and water characteristics.

CO2: Apply the water treatment concept, methods, water distribution processes and operation.

CO3: Carry out municipal water and wastewater treatment system operations and determine the sewage characteristics

CO4: Prepare basic processes of designs of wastewater treatment plants.

CO5: Design various sewage treatment plants and usage of solid wastes.

UNIT – I

INTRODUCTION: Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer.

WATER DEMAND AND QUANTITY STUDIES: Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies.

QUALITY AND ANALYSIS OF WATER: Characteristics of water – Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological.Impurities in water, Water borne diseases.Drinking water quality standards.

UNIT - II

WATER TREATMENT: Layout and general outline of water treatment units. Screening. Sedimentation - types of sedimentation tanks - design elements. Coagulation – coagulants – feeding arrangements – flocculation. Filtration – Classification of filters – working of slow and rapid gravity filters – design of filters – troubles in operation comparison of filters. Disinfection – theory of chlorination – chlorine demand, other disinfection practices – Miscellaneous treatment methods

WATER DISTRIBUTION: Distribution systems – Requirements, Layout of Water distribution systems - Design procedures- Hardy Cross and equivalent pipe methods.

UNIT – III

INTRODUCTION TO SANITATION: Systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- types of sewers,design of sewers, cleaning and ventilation of sewers. Engineered systems for solid waste management (reuse/ recycle energy recovery, treatment and disposal).

WASTE WATER COLLECTION AND CHARACTERSTICS: characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations.

UNIT IV

WASTE WATER TREATMENT: Layout and general outline of various units in a waste water treatment plant – Screens – grit chambers – skimming tanks – sedimentation tanks – biological treatment – trickling filters – standard and high rate – Construction and design of Oxidation ponds.

UNIT – V

SLUDGE TREATMENT: Sludge digestion – design of Digestion tank – septic tanks and Imhoff Tanks working principles and design – soak pits.

TEXT BOOKS:

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

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

3. Environmental Engineering by Peavy, TMH Publishers.

REFERENCS:

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1. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Person Education.
2. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.

Mapping with course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1					3				1		1
CO2	3	2	3			2	2	1	2				1	1
CO3	3	2	2			3	2	1				2	2	2
CO4	3	3	3				2	2				3	2	2
CO5	3	3	3			1	2	2				2	1	2

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Year: III   **Semester:II**

Subject Code	Subject Name	L	T	P	Credits
20APC0122	**Highway Engineering**	**3**	**0**	**0**	**3**

Course Outcomes: After the completion of the course student should be able to
CO1: Understand planning and alignment of highway.
CO2: Apply concept of the geometric design for highway.
CO3: Understand concept of traffic Engineering and its regulations.
CO4: Apply concept of intersection design for traffic flow.
CO5: Design of pavements as per IRC standards.

UNIT-I
HIGHWAY DEVELOPMENT AND PLANNING: Highway development in India – Necessity for highway planning – Different Road development plans – Classification of roads – Road network patterns – Highway alignment – Factors affecting alignment – Engineering surveys – Drawings and reports.
UNIT-II
HIGHWAY GEOMETRIC DESIGN: Importance of geometric design – Design controls and criteria – Highway cross section elements – Sight distance elements – Stopping sight distance, Overtaking sight distance and intermediate sight distance – Design of horizontal alignment – Design of super elevation and extra widening – Design of transition curves – Design of vertical alignment – Gradients – Vertical curves.
UNIT-III
TRAFFIC ENGINEERING & REGULATIONS : Basic Parameters of Traffic-Volume, Speed and Density - Traffic Volume Studies - Data Collection and Presentation - Speed studies - Data Collection and Presentation - Parking Studies – On street & Off street Parking - Road Accidents - Causes and Preventive Measures - Accident Data Recording – Condition Diagram and Collision Diagrams - Traffic Signs – Types and Specifications – Road Markings - Need for Road Markings-Types of Road Markings - Design of Traffic Signals – Webster Method
UNIT-IV
INTERSECTION DESIGN: Conflicts at intersections – Channelisation: Objectives – Traffic islands and design criteria – Types of At grade intersections – Types of grade separated intersections – Rotary intersection – Concept of rotary and design criteria – Advantages and disadvantages of rotary intersection.
UNIT-V
PAVEMENT DESIGN: Types of pavements – Difference between flexible and rigid pavements – Pavement components – Sub grade, Sub base, Base and wearing course – Functions of pavement components – Design factors – Flexible pavement design methods – G.I method, CBR method, (as per IRC 37-2012) – Design of rigid pavements – Critical load positions – Westergaard's stress equations.\ (as per IRC 58-2002).

TEXT BOOKS:
1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna Publications – 6th Edition – 1997.

REFERENCES:
1. Principles of Traffic and Highway Engineering – Garber &Hoel, Cengage Learning.
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali and Dr.N.BLal - Khanna Publications.
3. Highway Engineering – S.P.Bindra , DhanpatRai& Sons. – 4th Edition (1981)

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Mapping with course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	2					2		2		1			1	
CO2	2	3	2			2		2		1			2	2
CO3	2	2	1			1		2		2			1	1
CO4	2	2				1		2		1			1	2
CO5	2	3	3			2		2		2			2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III   **Semester:II**

Subject Code	Subject Name	L	T	P	Credits
20APC0124	**Foundation Engineering**	**3**	**0**	**0**	**3**

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

CO1: Understand the principles and methods of Soil Exploration

CO2: Decide the suitability of soils and check the stability of slopes

CO3: Calculate lateral earth pressures and check the stability of retaining walls

CO4: Determine the bearing capacity of shallow foundations

CO5: Estimate the bearing capacity of deep foundations

UNIT – I SOIL EXPLORATION:
Need – methods of soil exploration – boring and sampling methods – penetration tests – plate load test–
planning of soil exploration programme, -preparation of soil investigation report.

UNIT – II SLOPE STABILITY:
Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by
Swedish slip circle method, method of slices– Taylor's Stability Number.

UNIT – III EARTH PRESSURE THEORIES:
Active, Passive and at rest soil pressures Rankine's theory of earth pressure in cohesive and non-cohesive soils
– Earth pressures in layered soils -Coulomb's earth pressure theory. Culmann's and Rebhann Graphical method
for active case.

RETAINING WALLS: Types of retaining walls – stability of cantilever retaining walls.

UNIT – IV SHALLOW FOUNDATION
 Types - choice of foundation – location and depth - safe bearing capacity – shear criteria – Terzaghi's method
of bearing capacity- settlement criteria –plate load test – allowable settlements of structures.

UNIT - V PILE FOUNDATION
 Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pile formulae - pile
load tests - load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin
friction

TEXT BOOKS:
1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2.Basic and Applied Soil Mechanics by GopalRanjan& ASR Rao, New age International Pvt Ltd.
3. Soil Mechanics and Foundation by by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi,
publications Pvt. Ltd., New Delhi
4 .Soil Mechanics and Foundation Engg.By K.R. Arora, Standard Publishers and Distributors, Delhi.
5. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd, (2002).

REFERENCE BOOKS:
1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
2. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers.
3. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
4. Geotechnical Engineering by ManojDutta&Gulati S.K – Tata McGraw-Hill Publishers New Delhi.

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Mapping with course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2											1	2
CO2	2	3											1	2
CO3	2	3											2	2
CO4	2	3				2		2					2	3
CO5	2	3	3			3		2					2	3

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III   **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APE0104	Design and Drawing of Reinforced Concrete Structures	3	0	0	3

Course Outcomes: At the end of the course the student will able to

    CO1: Understand the basic design concepts of reinforced concrete structures.

    CO2: Design of various types of beams.

    CO3: Design of slabs and staircase.

    CO4: Design of columns

    CO5: Design of footings

UNIT –I

Introduction: Concepts of RCC Design –Introduction to Working stress method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS: 456 – 2000.

Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – II

Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

Limit state design for serviceability for deflection, cracking and codal provision.

UNIT – III

Design of Two-way slabs and one way slab Using I S Coefficients.

Design of Stair case – Dog legged and Open well.

UNIT –IV

Short and Long columns –axial loads, uni-axial and biaxial bending I S Code provisions.

UNIT – V

Design of Footings – Design and drawing of isolated square footing, rectangular footing

NOTE : All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.

2. Reinforcement detailing of continuous beams.

3. Reinforcement particulars of columns and footings.

4. Detailing of One way, two way and continuous slabs

TEXT BOOKS:

      1. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi

      2. Limit State Design of Reinforced Concrete by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:

      1. Limit State Design of RCC Structures – P.C.Varghese, Printice Hall of India, New Delhi

      2. Structural Design and Drawing by N.KrishnaRaju, University Press, Hyderabad

      3. Reinforced Concrete Design by Pillai&Menon, TMH Publishers.

      4. Analysis of Skeletal Structures by SeetharamuluKaveti, TMH publications.

Codes/Tables: IS 456-2000 and SP-16 code books to be permitted into the examinations Hall.

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part A and Part B. Part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered.

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Weightage for Part – A is 40% and Part- B is 60%.

Mapping with course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	3					2					3	3
CO2	1	3	3					2					3	3
CO3	1	3	3					2					3	3
CO4	1	3	3					2					3	3
CO5	1	3	3					2					3	3

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III **Semester:II**

Subject Code	Subject Name	L	T	P	Credits
20APE0105	**INTELLIGENT TRANSPORTATION SYSTEMS**	3	0	0	3

Course Outcomes: At the end of the course students will be able to

CO1: Understand the sensor technologies

CO2: Understand the communication techniques

CO3: Apply the various ITS methodologies

CO4: Understand the user needs

CO5: Define the significance of ITS under Indian conditions

UNIT - I

Introduction: Objectives- Advantages - Data Collection Techniques - Detectors – Automatic Vehicle Location - Automatic Vehicle Identification - Geographical Information Systems - Video Data Collection.

UNIT - II

Telecommunications in ITS: Importance of telecommunications in the ITS system - Information Management - Traffic Management Centers (TMC) - Vehicle–Road side communication – Vehicle Positioning System.

UNIT - III

ITS functional areas: Advanced Traffic Management Systems (ATMS) - Advanced Traveler Information Systems (ATIS) - Commercial Vehicle Operations (CVO) - Advanced Vehicle Control Systems (AVCS) - Advanced Public Transportation Systems (APTS) – Advanced Rural Transportation Systems (ARTS).

UNIT - IV

ITS User Needs and Services: Travel and Traffic management - Public Transportation Management - Electronic Payment - Commercial Vehicle Operations – Emergency Management - Advanced Vehicle safety systems - Information Management.

UNIT - V

Automated Highway Systems: Vehicles in Platoons – Integration of Automated Highway Systems - ITS Programs in the World – Overview of ITS implementations in developed countries - Case studies.

Text Books :

1. ITS Hand Book 2000: *Recommendations for World Road Association (PIARC),* Kan Paul Chen, John Miles.

2. Sussman, J. M., *Perspective on ITS*, Artech House Publishers, 2005.

3. *National ITS Architecture Documentation*, US Department of Transportation, 2007 (CDROM).

Reference Books :

1. Chowdhary, M.A. and A Sadek, *Fundamentals of Intelligent Transportation systems planning,* Artech House Inc., US, 2003.

Mapping with course outcomes with program outcomes

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2					2		2		1			1	
CO2	2	3	2			2		2		1			2	2
CO3	2	2	1			1		2		2			1	1
CO4	2	2				1		2		1			1	2
CO5	2	3	3			2		2		2			2	2

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Year: III   **Semester:II**

Subject Code	Subject Name	L	T	P	Credits
20APE0106	**Remote Sensing and GIS**	**3**	**0**	**0**	**3**

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

CO1: Understand principles of aerial photography

CO2: Understand the concept of remote sensing

CO3: Understand the concept of geographic information system

CO4: Analyze the GIS spatial data

CO5: Apply the concepts of GIS in water resources

UNIT – I

INTRODUCTION TO PHOTOGRAMMETRY:

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

REMOTE SENSING :

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

TYPES OF DATA REPRESENTATION:

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV

GIS SPATIAL ANALYSIS:

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

WATER RESOURCES APPLICATIONS:

Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1 Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2 Fundamentals of remote sensing by Gorge Joseph , Universities press, Hyderabad

REFERENCES:

1. Advanced Surveying : Total Station GIS and Remote Sensing – SatheeshGopi – Pearson Publication.
2. Remote Sensing and its applications by LRA Narayana University Press 1999.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.AnjiReddy ,B.S.Pubiliications,New Delhi.
5. GIS by Kang – Tsung Chang, TMH Publications & Co.,

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Mapping with course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1										1	2	2
CO2	3	1										1	2	2
CO3	3	1		1								1	2	2
CO4	3	3		2				2				2	3	2
CO5	3	3		2				2				2	3	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III		Semester:II			
Subject Code	**Subject Name**	**L**	**T**	**P**	**Credits**
20APC0125	**STAAD LAB**	**0**	**0**	**3**	**1.5**

Course Outcomes:
CO1: Understand basic commands used in STAAD Pro and their applications
CO2: Analyse and design of concrete structural elements for various loading conditions
CO3: Analyse and design of steel structural elements for various loading conditions

SOFTWARE:
1. STAAD PRO or Equivalent
EXCERCISIES:
1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. column Analysis & Design

TEXT BOOK:
1. computer Aided Design Lab Manual by Dr.M.N.SeshaPrakash And Dr.C.S.Suresh

Mapping with course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	3	3	1				3	1	2		2	3	2
CO2	3	3	3	1				3	1	2		2	3	2
CO3	3	3	3	1				3	1	2		2	3	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: III   **Semester:II**

Subject Code	Subject Name	L	T	P	Credits
20APC0126	ENVIRONMENTAL ENGINEERING LAB	0	0	3	1.5

Course Outcomes:

CO1: Determine physical, chemical and biological characteristics of water and wastewater

CO2: Determine optimum dosage of coagulant

CO3: Assess the quality of water and wastewater

LIST OF EXPERIMENTS

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.

NOTE: At least 8 of the above experiments are to be conducted.

Mapping with course outcomes with program outcomes

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2		3	3	3	3	2		2	3	2
CO2	3	3		2		3	3	3	3	2		2	3	2
CO3	3	3		2		3	3	3	3	2		2	3	2

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Year: III   **Semester:II**

Subject Code	Subject Name	L	T	P	Credits
20APC0127	**Highway Engineering lab**	**0**	**0**	**3**	**1.5**

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

CO1: Determine the properties of coarse aggregate

CO2: Determine the properties of bitumen

CO3: Analysis of trafficvolume data.

LIST OF EXPERIMENTS

I. ROAD AGGREGATES:
1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test.
5. Shape tests

II. BITUMINOUS MATERIALS:
1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

III TRAFFIC FIELD STUDIES
1. Traffic Volume Studies at Mid-block and Data Analysis
2. Traffic Volume Studies at Intersection and Data Analysis

LIST OF EQUIPMENT:
1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometer.
4. Los angles Abrasion test machine
5. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Penskey – Morten's apparatus
11. Relevant IS Codes

Mapping with course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		2	2	2			1	1
CO2	3	3				2		2	2	2			1	1
CO3	3	3	2			2		2				3	2	2

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

Subject Code 20AHE9902	Subject Name **Principles of Effective Public Speaking**	L T P 1 0 2	Credit: 2

Course Objectives:

1. Gain and demonstrate the basic skills of effective oral communication, for use throughout your academic career and beyond.
 2. Learn and develop the skills necessary to maximize public speaking effectiveness, including effective research and organization of information, how to make the most of presentation aids (and not become reliant on them!), and understanding the speaker-audience relationship.
3. Develop critical thinking and listening skills, enabling you to maximize your own understanding as an audience member, and offer considered and constructive critiques of others' speeches.
4. Become more confident in public speaking arenas, whether as a formal speech giver or as a participant in group settings. Improvement will be valued over perfection.

Syllabus

Unit -1

Introduction to Public Speaking:

  Basic communication concepts, processes – Models of Communication, concepts and principles of public speaking - Steps and methods of speech preparation.

Unit -2

Selecting Topic and Knowing your Audience:

  Identifying sources; Tools and techniques for selecting and refining speech topics - Identifying speech purposes - Central idea statement - Audience analysis techniques.

Unit – 3

Listening with a purpose:

Effective listening, the listening process, and types of listening; Listening barriers; Identifying and improving listening styles.

Unit - 4

Speaking with a purpose:

 Methods of speech preparation - Informative, persuasive, and ceremonial speeches

Unit -5

Delivering your speech and using Visual Aids:

  The mechanics of verbal and nonverbal communication in speech delivery - Effective delivery techniques
  - Incorporating presentation aids in presentation.

Course Outcomes:

Students will be able to:

 1. Apply knowledge of principles, concepts and skills learned in speech preparation.
 2. Develop skills in speech composition.
 3. Develop skills in effective listening.
 4. Evaluate the delivery of speeches.
 5. Use supporting materials and presentation aids in speech preparation.

References:

 1. DeVito, J.A. (2009). The Essential Elements of Public Speaking. (3rd ed.) Boston: Pearson Education, Inc.

 2. Lucas, S.E. (2009). The Art of Public Speaking. (10th ed.) New York: McGraw - Hill Co.

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3. Zarefsky, D. (2011). Public Speaking: Strategies for Success. (6th ed. Boston: Pearson Education, Inc).

Mapping of course outcomes with program outcomes

Os	Programme Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		
CO2										3		
CO3										3		
CO4										3		
CO5										3		

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Subject Code 20AMC9901	Subject Name BIOLOGY FORENGINEERS	L T P 3 0 0	Credits 0

Course Outcomes:

1. Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
2. Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.
3. Brief about human physiology.
4. Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
5. Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.

Unit I: Introduction to Basic Biology   (10 hrs)

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes.Prokaryotic and eukaryotic Cell.Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Unit II: Introduction to Biomolecules   (10hrs)

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types.Enzymes, Enzyme application in Industry.Large scale production of enzymes by Fermentation.

Unit III: Human Physiology   (08hrs)

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration).Respiratory organs, respiratory cycle.Excretory system.

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology(08hrs)

Prokaryotic gene and Eukaryotic gene structure.   DNA   replication,   Transcription   and Translation.DNA technology.Introduction to gene cloning.

Unit V: Application of Biology   (10 hrs)

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies.Basics of biosensors, biochips, Bio fuels, and Bio Engineering.Basics of Production of Transgenic plants and animals.

Text books:
1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:
1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011

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3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed..Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014.

Mapping of course outcomes with program outcomes

COs	Programme Outcomes(POs) & Programme Specific Outcomes(PSOs)													
	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2										1		
CO2	3	2										1		
CO3	3	2										1		
CO4	3	2										1		
CO5	3	2										1		

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Semester VII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max.Marks)		
				L	T	P	C	CIE	SEE	Total
1	Professional Elective courses	20APE0107	Estimation, Costing & Valuation	3	0	0	3	30	70	100
		20APE0108	Environmental Impact Assessment and management							
		20APE0109	Railways airport Docks and Harbours							
2	Professional Elective courses	20APE0110	Hydrology and Water Resources Engineering	3	0	0	3	30	70	100
		20APE0111	Design and Drawing of irrigation structures							
		20APE0112	Watershed and River Basin Management							
3	Professional Elective courses	20APE0113	Design and Drawing of steel Structures	3	0	0	3	30	70	100
		20APE0114	Advanced Structural Design							
		20APE0115	Bridge Engineering							
4	Open Elective course / Job Oriented Elective	20APC0516	Computer Networks	3	0	0	3	30	70	100
		20AHSMB02	Entrepreneurship							
		20AHSMB04	Intellectual Property Rights							
5	Professional Elective courses (CBCS)	20APE0116	Pre-stressed Concrete	3	0	0	3	30	70	100
		20APE0117	Ground Improvement Techniques							
		20APE0118	Repair and Rehabilitation of Structures							
6	**Humanities &Social Science Elective***	20AOE9901	English For Research Paper Writing	3	0	0	3	30	70	100
		20AHE9903	Professional Communication							
7	**Skill Advanced Course***	20APC0129	Structural Analysis Design Software	1	0	2	2	100	-	100
Industrial/ Research Internship 2 months (Mandatory) after Third Year (to be evaluated duringVII semester				0	0	0	3	100	-	100
Total credits							23	380	420	800
	Honors/Minor courses(Thehoursdistributioncanbe3-0-2or3-1-0 also)			4	0	0	4	30	70	100

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Year: IV   **Semester:I**

Subject Code	Subject Name	L	T	P	Credits
20APE0107	**ESTIMATION, COSTING AND VALUATION**	3	0	0	3

Course Outcomes:
At the end of the course the student will able to
> CO1: Apply different types of estimates for different building elements
> CO2: Carry out analysis of rates and bill preparation different building elements
> CO3: Carry out estimation of earthwork and reinforcement
> CO4: Understand the contracts and tenders
> CO5: Carry out rate analysis and valuation of building items

UNIT – I
INTRODUCTION: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.
STANDARDS SPECIFICATIONS: Standard specifications for different items of building construction
UNIT – II
ESTIMATION OF BUILDINGS: Detailed Estimates of Buildings
UNIT – III
EARTHWORK ESTIMATION: Earthwork for roads and canals.
REINFORCEMENT ESTIMATION: Reinforcement bar bending and bar requirement schedules.
UNIT – IV
CONTRACTS AND TENDERS: Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.
UNIT – V
RATE ANALYSIS: Working out rate analysis for various items of work using Standard schedule of rates.
VALUATION: Valuation of buildings.
TEXT BOOKS
1. Estimating and Costing, 27th revised edition by B.N. Dutta, UBS publishers, 2000.
2. Civil Engineering Contracts and estimations, 4th edition by B.S.Patil, Universities Press, Hyderabad.
REFERENCES :
1. Engineering Construction Cost 6th edition by Peurifoy, TMH Publications
2. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
3. Standard Schedule of Rates and Standard Data Book by Public Works Department.
4. I. S. 1200 (Parts I to XXV – 1974/ Method of Measurement of Building and Civil Engineering works – B.I.S.)
5. National Building Code

Note : Standard schedule of rates is permitted in the examination hall.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		2		1	1	1	2	2
CO2	3	3				2		2		1	1	1	2	2
CO3	3	3				2		2		1	1	1	2	3
CO4	3												2	2
CO5	3	3				3		2		1	2	1	1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: IV   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0108	Environmental Impact Assessment and management	3	0	0	3

COURSE OUTCOMES

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

CO1: Prepare EMP, EIS, and EIA report**.**

CO2: Identify the risks and impacts of a project**.**

CO3: Choose an appropriate EIA methodology**.**

CO4: Evaluation the EIA report**.**

CO5: Estimate the cost benefit ratio of a project**.**

UNIT –I:

Concepts and methodologies of EIA

Initial environmental Examination, Elements of EIA, - Factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters- Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT – II

Impact of Developmental Activities and Land Use

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT –III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation - Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-Advantages of Environmental Risk Assessment

UNIT – IV

Environmental audit:

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT – V

Environmental Acts and Notifications:

The Environmental protection Act, The water preservation Act, The Air (Prevention & Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- Evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000.

TEXT BOOKS:

1. Canter Larry W., ―Environmental Impact Assessment‖, McGraw-Hill education Edi (1996)
2. Y. Anjaneyulu, ―Environmental Impact Assessment Methodologies‖, B. S. Publication, Hyderabad.

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REFERENCES:
1.Peavy, H. S, Rowe, D. R, Tchobanoglous, ―Environmental Engineering‖, G.Mc-Graw Hill International Editions, New York 1985
2.J. Glynn and Gary W. Hein Ke, ―Environmental Science and Engineering‖, Prentice Hall Publishers
3. Suresh K. Dhaneja, ―Environmental Science and Engineering‖, S.K., Katania& Sons Publication, New Delhi.
4. H. S. Bhatia, ― Environmental Pollution and Control‖, Galgotia Publication (P) Ltd, Delhi.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	2
CO2	3												2	2
CO3	3												2	2
CO4	3												2	2
CO5	3												2	2

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Year: IV   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0109	Railways airport Docks and Harbours	3	0	0	3

COURSE OUTCOMES:
At the end of the course, the students will be able to:

CO1: Understand the components of permanent way and its components and theirfunctions and requirements.
CO2: Understand the geometric design elements of Railway track like cant, radius of curveand degree of curve etc..and their design components.
CO3: Understand the Aircraft characteristics and their influence on various design elementsof an Airport.
CO4: Understand the concepts of runway orientation, Airport lighting, Airport componentsand their planning and geometric design of runways and taxiways.
CO5: Understand the difference between ports and Harbours, types of Ports and Harbours,various facilities needed in Ports and Harbours and NavigationalAids for ships.

Unit – I
Railway Engineering:
Introduction – Permanent way components – Cross section of permanent way – Functions and requirements of rails, sleepers and ballast – Types of gauges – Creep of rails – Theories related to creep – Coning of wheels – adzing of sleepers – Rail fastenings.
Unit – II
Geometric design of railway track
Gradients – Grade compensation – Cant and negative super elevation – Cant deficiency – Degree of curves – Safe speed on railway track – Points and crossings – Layout and functioning of left hand turn out and right hand turn outs – Station yards – Signaling and interlocking.
Unit –III
Airport Engineering
Airport site selection – Factors affecting site selection and surveys- Runway orientation – Wind rose diagram – basic runway length – Correction for runway length – Terminal area – Layout and functions – Concepts of terminal building – Simple building , Linear concept, pier concept and satellite concept – Typical layouts .
Unit – IV
Geometric design of runways and taxiways
Aircraft characteristics – Influence of characteristics on airport planning and design – Geometric design elements of runway – Standards and specifications - Functions of taxiways – Taxiway geometric design – Geometric elements and standard specifications – Runway and taxiway lighting.
Unit – V
Ports and Harbors
Requirements of ports and harbors – Types of ports – Classification of harbors – Docks and types of docks – Dry docks, wharves and jetties – Breakwaters: layouts of different types of harbors and docks – Dredging operations – navigation aids.

Text books:
1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. SatishChandra andAgarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand& Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

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References:
1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitechpubilishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2					2		2		1			1	
CO2	2	3	2			2		2		1			2	2
CO3	2	2	1			1		2		2			1	1
CO4	2	2				1		2		1			1	2
CO5	2	3	3			2		2		2			2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: IV   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0110	**HYDROLOGY & WATER RESOURCES ENGINEERING**	3	0	0	3

COURSE OUTCOMES (COs)
At the end of the course, the students will be able to:

CO1: To understand importance of hydrology, hydrological cycle and estimate precipitation, runoff, evaporation, evapotranspiration and infiltration. Classify different type of geological formation of ground water and estimate yield

CO2: To understand various types of irrigation and describe principals of irrigation

CO3: To study the principals of crop water requirements and determine the irrigation crop water requirements

CO4: To Study the canal regulation works and design various elements in canal regulation works

CO5: To Understand the different types of cross drainage works , the concepts of reservoir planning and various types of dams and estimate the stability of gravity of dam

UNIT – I
Introduction to Hydrology: Engineering Hydrology and its applications; Hydrologic Cycle; Precipitation- Types and Forms; Evaporation- Factors affecting & measurement of Evaporation; Infiltration - Factors affecting & measurement of infiltration - Infiltration Indices; Run-off- Factors affecting Run-off - Computation of Run-off
Hydrograph Analysis: Hydrograph-Unit Hydrograph- Construction and limitations of Unit Hydrograph - Application of Unit Hydrograph - S-Hydrograph
UNIT – II
Ground Water: Aquifer – Aquiclude – Aquifuge - Aquifer parameters; Porosity - Specific yield - Specific retention; Types of aquifers - Well Hydraulics - Darcy's Law - Steady radial flow to a well; Dupuit's theory for confined and unconfined aquifers
Irrigation: Introduction - Necessity and importance of Irrigation - Advantages and effects of Irrigation - Types of Irrigation - Methods of Application of Irrigation water -Duty and Delta - Relation between Duty and Delta - Factors affecting Duty - Methods of improving Duty
UNIT – III
Water Requirement of Crops: Types of Soils; Gross Command Area - Culturable Command Area - Culturable Cultivated and Uncultivated Area; Kor Depth and Kor Period - Crop seasons and Crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Consumptive use of water - Factors affecting consumptive use
Canal Regulation Works: Canal falls- Necessity and location of falls- Types and classification of falls; Roughening devices; Design of sarada type fall; Canal regulators- Off take alignment- Head regulators and cross-regulators- Design of cross-regulator and distributary head regulator
UNIT – IV
Cross Drainage Works: Introduction- Types of cross drainage works- Selection of suitable type of cross drainage work- Classification of aqueducts and siphon aqueducts.
Reservoir Planning: Introduction- Investigations for reservoir planning- Selection of site or a reservoir- Zones of storage in a reservoir; Storage capacity and yield- Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Life of reservoir; Flood routing- Methods of flood routing Graphical Method (Inflow storage discharge curves method)

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UNIT – V
Dams: General: Introduction- Classification according to use- Classification according to material- Gravity dams- Arch dams- Buttress dams- Steel dams- Timber dams- Earth dams and rock fill dams- Advantages and disadvantages- Physical factors governing selection of type of dam- Selection of site for a dam
Gravity Dams: Introduction- Forces acting on a gravity dam- Modes of failure- Stability requirements- Principal and shear stresses- Stability analysis- Elementary profile of a gravity dam- Practical profile of a gravity dam- Limiting height of a gravity dam- High and low gravity dams- Design of gravity dams– Single step method- Galleries- Stability analysis of non-overflow section of Gravity dam

TEXT BOOKS
1. K Subramanya, *Engineering Hydrology*, McGraw Hill Publication, 4th Edition

2. Dr. B.C. Punmia, Dr. PandeBrijBasiLal, Ashok Kumar Jain, Dr. Arun Kumar Jain, *Irrigation and Water Power Engineering*, Laxmi Publications,16th Edition

REFERENCES
1. Dr. P.N. Modi, *Irrigation Water Resources and Power Engineering*, Standard Book House, 9th Edition
2. Dr. P. Jaya Rami Reddy, *A Textbook of Hydrology*, Laxmi Publications, 3rd Edition
3. Santhosh Kumar Garg, *Water Resource Engineering Vol.I& Vol. II*, Khanna Publishers, 23rd Edition
4. Arora, K.R., Irrigation, Water Power and Water Resources Engineering, Standard Publishers Distributors, New Delhi, 2009

Mapping of course outcomes with program outcomes

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	3				1		1				1		
CO2	3	3											1	
CO3	3	3						2				1	1	
CO4	3	3	3					1				2	2	1
CO5	3	3	3					2				2		1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: IV   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0111	**Design and Drawing of irrigation structures**	**3**	**0**	**0**	**3**

Final Examination pattern: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be threehours.

Course Outcomes:
At the end of the course, the students will be able to:

CO1: Design and draw the plan and cross section of Sloping glacis weir.

CO2: Design and draw the plan and cross section of Tank sluice with tower head

CO3: Design and draw the plan and cross section of Type III Syphon aqueduct

CO4: Design and draw the plan and cross section of Surplus weir.

CO5: Design and draw the plan and cross section of Trapezoidal notch fall and Canal regulator.

Design and drawing of the following irrigation structures.

1. Sloping glacis weir

2. Surplus weir.

3. Tank sluice with tower head

4. Type III Syphon aqueduct.

5. Canal regulator.

TEXT BOOKS:
>   1. C.Satyanarayana Murthy, ―Design of minor irrigation and canal structures‖, Wiley eastern Ltd.
>   2. S.K.Garg, ―Irrigation engineering and Hydraulic structures Standard‖

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	3			2		2					2	
CO2	1	3	3			2		2					2	
CO3	1	3	3			2		2					2	
CO4	1	3	3			2		2					2	
CO5	1	3	3			2		2					2	

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Year: IV   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0112	**Water shed and River Basin Management**	3	0	0	3

Course Outcomes

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

CO1. Know the basic principles of watershed management.

CO2. Know the river basin management practices.

CO3. Understand better different approaches for conservation of water.

CO4. Identify sustainable watershed approach for resources management, prevention of soil erosionetc.,

CO5.Different methods of rainwater harvesting management systems and role of GIS.

UNIT – I

Principles of Watershed Management: Basics concepts, Hydrology and water availability, Surface water, Groundwater, Conjunctive use, Human influences in the water resources system, Water demand, Integrated water resources system.

UNIT – II

River basin Watershed Management Practices in Arid and Semi-arid Regions, Watershed management through wells, Management of water supply -Case studies, short term and long term strategic planning.

UNIT – III

Conservation of Water: Perspective on recycle and reuse, Waste water reclamation Social Aspects of Watershed Management: Community participation, Private sector participation, Institutional issues, Socio-economy, Integrated development, Water legislation and implementations, Case studies.

UNIT – IV

Sustainable Watershed Approach: Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, Soil erosion and conservation

UNIT – V

Water Harvesting: Rainwater management -conservation, storage and effective utilisation of rainwater, Structures for rainwater harvesting, roof catchment system, check dams, aquifer storage Applications of Geographical Information System and Remote Sensing in Watershed Management, Role of Decision Support System in Watershed Management.

Text Books

1.Murthy, J.V.S., "Watershed Management in India", Wiley Eastern, New Delhi, 1994.

Water shed management Reference Books

1. Murty, J.V.S., "Watershed Management", New Age Intl., New Delhi1998.

2. Allam, G.I.Y., "Decision Support System for Integrated Watershed Management", ColoradoStateUniversity,1994.

3. Vir Singh, R., "Watershed Planning and Management", Yash Publishing House, Bikaner, 2000.

4. American Society of Civil Engineers, Watershed Management, American Soc. of Civil Engineers, New York, 1975

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2										3		1	1
CO2	2										3		1	1
CO3	2										3		1	1
CO4	2										3		1	1
CO5	2										3		1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: IV   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0113	**DESIGN & DRAWING OF STEEL STRUCTURES**	3	0	0	3

Course Outcomes:

At the end of the course the student will able to

CO1: Understand the basic concepts of Steel structures and design of Tension members

CO2: Analyze and Design of compression members

CO3: Analyze and design of beams

CO4: Analyze and design of Plate girder

CO5: Analyze and design of Gantry Girder and simple roof truss

UNIT – I

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads–and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint - Design of Tension members – Design Strength of members.

UNIT – II

Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

UNIT – III

Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams.

UNIT – IV

Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plate's stiffeners – splicing and connections.

UNIT – V

Gantry Girder : Gantry girder impact factors – longitudinal forces, Design of Gantry girders - Design of simple roof truss.

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Column including lacing and battens.

Plate 3 Detailing of Column bases – slab base and gusseted base

Plate 4 Detailing of Plate girder including curtailment, splicing and stiffeners.

Plate 5 Detailing of Gantry girder and simple roof truss.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS

1. Design of Steel Structures by Dr.B.C.Punmia,A.K.Jain, Lakshmi Pubilications.
2. Limit State Design of Steel Structures by Subramanyam.N, Oxford University press, New Delhi
3. Limit State Design of Steel Structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.

REFERENCES

1. Fundamentals of Structural Steel Design by M.L.Gambhir, TMH publications.
2. Structural Design and Drawing by N.KrishnaRaju, University Press, Hyderabad.
3. Structural design in steel by SarwarAlamRaz, New Age International Publishers, New Delhi
4. Design of Steel Structures by Edwin Gaylord, Charles Gaylord, James Stallmeyer, Tata Mc.Graw-Hill, New Delhi.

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Codes/Tables:
IS Codes:
1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code.
Note: IS 800-2007 and steel tables are to be permitted into the examination hall.

Mapping of course outcomes with program outcomes

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	3	3			1		2				1	2	3
CO2	3	3	3			1		2				1	2	3
CO3	3	3	3			1		2				1	2	3
CO4	3	3	3			1		2				1	2	3
CO5	3	3	3			1		2				1	2	3

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Year: IV   **Semester: I**

SubjectCode	TitleoftheSubject	L	T	P	C
20APE0114	**ADVANCEDSTRUCTURALDESIGN**	3	0	0	3

COURSEOUTCOMES

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

CO1: Understand the basic concepts of concrete beams and slabs by different codes

CO2: To know the concepts of deep beams by British practice-ACI–IS456

CO3: Apply design concepts to Shear In Flat Slabs And Flat Plates

CO4: Apply design concepts to Plain Concrete Walls And Shear Walls

CO5: Understand the basic concepts of fire resistance

UNIT:I

Deflection Of Reinforced Concrete Beams And Slabs: Introduction -Short-TermDeflection Of Beams And Slabs -Deflection Due To - Imposed Loads - Short- TermDeflection Of Beams Due To Applied Loads- Calculation Of Deflection By IS 456 -Calculation Of Deflection By BS 8110 - Deflection Calculation By Euro code – ACISimplifiedMethod-DeflectionOfContinuousBeams ByIS456 –DeflectionOfCantilevers
-DeflectionOfSlabs

UNIT:II

Estimation Of Crack Width In Reinforced Concrete Members And Design Of Deep Beams: Introduction-FactorsAffectingCrackwidthInBeams-MechanismOfFlexural

Cracking Calculation Of Crack Widths - Simple Empirical Method - Estimation Of Crack width In -Beams By IS 456 Of BS 8110 - Shrinkage And Thermal Cracking. Deep Beams: Introduction - Minimum Thickness - Steps Of Designing Deep Beams - Design By IS 456 - Design According To British Practice - ACI Procedure For Design Of Deep Beams – Checking For Local Failures-Detailing Of Deep Beams.

UNIT:III

Shear In Flat Slabs And Flat Plates: Introduction - Checking For One-Way (WideBeam) Shear - Two-Way (Punching) Shear Permissible Punching Shear - Shear Due To Unbalanced Moment (Torsional Moments) Calculation Of J Values - Strengthening Of Column Areas For Moment Transfer By Torsion Which Produces Shear – Shear Reinforcement Design - Effect Of Openings In Flat Slabs - Recent Revisions In ACI 318 - Shear In Two –Way Slabs With Beams.

UNIT:IV

Design Of Plain Concrete Walls And Shear Walls: Introduction - Braced And Unbraced Walls - Slenderness Of Walls- Eccentricities Of Vertical Loads At Right Angles To Wall - Empirical Design Method For Plane Concrete Walls Carrying Axial Load – Design Of Walls For In-Plane Horizontal Forces - Rules For Detailing Of Steel In Concrete Walls Design Of Shear Walls: Introduction - Classification Of Shear Walls – Classification According To Behavior - Loads In Shear Walls - Design Of Rectangular And Flanged Shear Walls-Derivation Of Formula For MomentOfResistanceOfRectangularShearWalls28

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UNIT:V

Design Of Reinforced Concrete Members For Fire Resistance : Introduction - ISO834 Standard Heating Conditions- Grading Or Classification - Effect Of High Temperature On Steel And Concrete - Effect Of High Temperatures On Different Types Of Structural Members - Fire Resistance By Structural Detailing From Tabulated Data – Analytical Determination Of The Ultimate Bending Moment Capacity Of Reinforced Concrete Beams Under Fire-Other Considerations

Text/ReferenceBooks:

1. P.Purushothaman, Reinforced Concrete Structural Elements: Behaviour, Analysis AndDesign,TataMcgraw Hill.
2. C.E. Reynolds And J.C. Steedman, Reinforced Concrete Desigers Hand Book, A ViewPointPublication.
3. Limit State Design Of Reinforced Concrete Structures By P.Dayaratnam, Oxford &IbhPublishers. 4. Advanced Rcc By N.KrishnaRaju, Cbs Publishers & Distributors. 5.ReinforcedCementConcrete Structures –DevdasMenon&UnnikrishnaPillai,

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3					2						
CO2	3	3	3					2						
CO3	3	3	3					2						
CO4	3	3	3					2						
CO5	3	3	3					2						

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: IV			Semester: I			
Subject Code	**Subject Name**		**L**	**T**	**P**	**Credits**
20APE0115	**BRIDGE ENGINEERING**		3	0	0	3

Course outcomes:

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

CO1: Understand the IRC classes of loading and railway bridge rules for detailed calculation of loadings and design of various components.

CO2: Design the basic components of bridge structures like bridge deck slabs longitudinal girders transverse girders, piers and well foundations.

CO3: Understand the IRC classes of loading and railway bridge rules for detailed calculation of loadings and design of various components.

CO4: Know the methods of design of structural components of different types of Bridges

CO5: Study various design aspects associated with design of Piers and Abutments.

UNIT - I

INTRODUCTION:

Importance of site investigation in Bridge design.Highway Bridge loading standards.Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BOX CULVERT : General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.

BRIDGE BEARINGS :

General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT - II

DECK SLAB BRIDGE :

Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

UNIT - III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE)

General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT – IV

PLATE GIRDER BRIDGE :

Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.

COMPOSITE BRIDGES :

Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors

UNIT V

PIERS & ABUTMENTS:

General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

TEXT BOOKS :

1. Bridge Engineering by PonnuSwamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.KrishnamRaju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Relevant – IRC & Railway bridge Codes.

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REFERENCE :-

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Design of Bridges Structure by D.J.Victor
3. Design of Steel structures by Ramachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of Bridges Structure by T.R.Jagadish&M.A.Jayaram Prentice Hall of India Pvt., Delhi.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	3			2		2				2	2	
CO2	1	3	3			2		2				2	2	
CO3	1	3	3			2		2				2	2	
CO4	1	3	3			2		2				2	2	
CO5	1	3	3			2		2				2	2	

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Year: IV   Semester: I

Course Code	Computer Networks	L	T	P	C
20APC0516		**3**	**0**	**0**	**3**
Pre-requisite	**Digital Communications and Operating Systems**	**Semester**		**III -I**	

Course Objectives:
The students will be able to

- Run and manage the Internet, part of the Internet, or an organization's network that is connected to the Internet.
- understand the basics of data communications and networking
- the protocols used in the Internet communication

Course Outcomes:
CO1: understand the basics of data communications and networking
CO2: classify the functionalities of two sub layers of Data link Layer
CO3: know briefly about Network Layer through algorithms and protocols
CO4: distinguish the services provided by Transport Layer
CO5: recognize the services offered by Application Layer to the user

UNIT - I		9 Hrs

Introduction: Data Communications, Networks, Network Types, Internet History, Standards and Administration.
Network Models: Protocol Layering, TCP/IP Protocol Suite, The OSI Model
Introduction to Physical Layer: Data and Signals, Transmission Impairment, Data Rate Limits, Performance. Transmission Media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched Networks, Packet Switching

UNIT - II		9Hrs

The Data Link Layer: Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol.

Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

UNIT - III		9 Hrs

The Network Layer: Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking.
The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT - IV		9 Hrs

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

UNIT - V		9 Hrs

The Application Layer: Introduction, Client-Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

Textbooks:

1. "Data communications and networking", Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.
2. "Computer Networks", Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.

Reference Books:

1. Data Communication and Networks, Bhushan Trivedi, Oxford
2. "Internetworking with TCP/IP – Principles, protocols, and architecture - Volume 1, Douglas E. Comer, 5th edition, PHI
3. "Computer Networks", 5E, Peterson, Davie, Elsevier.

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| 4. | "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications. |
| 5. | "Computer Networks and Internets with Internet Applications", Comer. |

Online Learning Resources:

https://www.youtube.com/watch?v=O--rkQNKqls&list=PLbRMhDVUMngf-peFloB7kyiA40EptH1up

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	
CO2	2	3											2	
CO3	2	2	3		1								2	
CO4	2	3	3		2								3	2
CO5	2	2											1	

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Year: IV   Semester: I

Course Code	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
20AHSMB02		3	0	0	3
	(Common to All branches of Engineering)				

Course Outcomes (CO):

- Understand the concept of Entrepreneurship and challenges in the world of Competition.
- Apply the Knowledge in generating ideas for New Ventures and design business plan structure.
- Analyze various sources of finance and subsidies to entrepreneurs.
- Evaluate the role of central government and state government in promoting women Entrepreneurship.
- Study the role of incubations in fostering startups.

UNIT - I	**Introduction to Entrepreneurship**

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

UNIT - II	**Formulation of Business Idea**

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

UNIT - III	**Financial Aspects of Promotion**

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey-Institutions in aid of entrepreneurship development.

UNIT - IV	**Women Entrepreneurship**

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

UNIT - V	**Startups and Incubation**

Startups – Definition, Role of startups in India, Governmental initiatives to foster entrepreneurship across sectors. Funding opportunities for startups. Business Incubation and its benefits, Pre-Incubation and Post - Incubation process.

Textbooks:

1. D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective – Cengage Learning,   2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
2 . Nandan H, " Fundamentals of Entrepreneurship", PHI, 2013.

Reference Books:

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1.   Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2.   Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3.   B.Janakiram and M.Rizwana‖ "Entrepreneurship Development: Text &Cases", Excel Books, 2011.
4.   Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

Online Learning Resources:

1.   Entrepreneurship-Through-the-Lens-of-venture Capital
2.   http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
3.   http://nptel.ac.in/courses/122106032/Pdf/7_4.pd
4.   http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurship/50

Mapping of course outcomes with program outcomes

Course Outcomes (COs)	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3							1						
CO2			3								1			1
CO3										2	3			
CO4						3				1				1
CO5			3							2				1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: IV   Semester: I

Subject Code: 20AHSMB04	Subject Name: INTELLECTUAL PROPERTY RIGHTS	L T P 3 - -	Credits 03

Course Outcomes

CO1: know about the concepts of intellectual property rights
CO2: Aware about the process of acquisition of trade mark rights
CO3: Understand about the law of copy rights
CO4: Acquainted with the concepts of Trade secretes
CO5: understand intellectual property laws at the international level.

UNIT-I

Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III

Law of Copy Rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of Patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT-IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secret elitigation. Unfair Competition: Misappropriation right of publicity, false advertising.

UNIT-V

New Development Of Intellectual Property: New developments in trade mark law; copy right law, patent law, intellectual property audits -International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS

1. Intellectual property right, Deborah, E. Bouchoux, Cengage learning
2. Intellectual property rights: Protection and Management. India, Nityananda KV, Cengage
Learning India Private Limited.

REFERENCES

1. Intellectual property right - Unleashing the knowledge economy, Prabuddhaganguli, Tata
McGraw Hill Publishing Company Ltd.
2. Law relating to Intellectual Property rights. India. Ahuja VK IN: Lexis Nexis
3. Intellectual Property Rights, India. Neeraj P &Khushdeep D, PHI learning pvt limited

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Mapping of course outcomes with program outcomes

Course Outcomes (COs)	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	**PSO1**	**PSO2**
CO1	**3**													
CO2	**2**					**2**								
CO3	**1**						**2**							
CO4	**1**							**2**						
CO5							**2**							

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Year: IV   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0116	**Pre-stressed Concrete**	**3**	**0**	**0**	**3**

COURSE OUTCOMES

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

CO1: Understand the concepts of pre-stressing and methods of pre stressing.

CO2; Compute losses of pre-stress in pre-stressed concrete members.

CO3; Design PSC beams under flexure and shear..

CO4; Estimate the short- and long-term deflections of PSC beams.

CO5; Apply prestressing concepts for composite beams.

UNIT -I

Introduction:

Principles of pre-stressing – Pre stressing systems - Pre-tensioning and post tensioning- Advantages and limitations of Pre stressed concrete- Need for high strength materials. Methods of pre-stressing: Pre-tensioning (Hoyer system) and Post-tensioning methods (Freyssinet system and Gifford- Udall System).

UNIT –II

Losses of pre-stress:

Loss of pre-stress in pre-tensioned and post-tensioned members due to elastic shortening, shrinkage and creep of concrete, relaxation of stress in steel, anchorage slip and frictional losses.

UNIT -III

Flexure and shear:

Analysis of beams for flexure and shear - Beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons- Kern line - Cable profile - Design of PSC beams (rectangular and I sections) using IS 1343. Analysis and design of rectangular and I beams for shear. Introduction to Transmission length and End block (no Design and Analytical problems).

UNIT – IV

Deflections:

Control of deflections- Factors influencing deflections - Short term deflections of uncracked beams- Prediction of long time deflections.

UNIT – V

Composite beams:

Different Types- Propped and Un-propped- stress distribution- Differential shrinkage- Analysis of composite beams.

TEXT BOOKS:

1. N. Krishna Raju, ―Prestressed Concrete‖, Tata Mc.Graw Hill Publications.
2. Praveen Nagrajan, ―Prestressed Concrete Design‖, Pearson publications, 2013.

REFERENCES:

1. T.Y. Lin & Ned H. Burns, ―Design of Prestressed Concrete Structures‖, John Wiley & Sons.
2. Ramamrutham, ―Prestressed Concrete‖, Dhanpatrai Publications.
3. Rajagopalan, ―Prestressed concrete‖, Narosa Publishing House.
4. BIS code on ―prestressed concrete‖, IS: 1343 to be permitted into the examination Hall.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	2
CO2	3	3											2	2
CO3	3	3											2	2
CO4	3	3											2	2
CO5	3	3											2	2

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Year: IV   **Semester: I**

Subject Code	Subject Name	L	T	P	Credits
20APE0117	**GROUND IMPROVEMENT TECHNIQUES**	3	0	0	3

OUTCOMES:
At the end of the course, the students will be able to:
  CO1 : Understand the grouting techniques and their applications
  CO2 : Understand the densification methods used in granular soils and Cohesive soils
  CO3 : Understand the ground Improvement methods used to stabilize soil
  CO4 : Understand the reinforcement design principles and geosynthetic materials, functions and applications
  CO5 : Identify the problems in Expansive soils

UNIT – I
GROUTING: Introduction to ground modification, need and objectives of Grouting- Grouts And Their Properties- Grouting Methods Ascending, Descending And Stage Grouting- Hydraulic Fracturing In Soils And Rocks Post Grout Test.

UNIT – II
IN-SITU DENSIFICATION OF COHESIVE AND COHESIONLESS SOILS:
In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT – III STABILISATION:
Methods of Stabilization-Mechanical-Cement- Lime, Chemical Stabilization With Calcium Chloride, Sodium Silicate And Gypsum

UNIT – IV REINFORCED EARTH:
Principles – Components of Reinforced Earth – Factors Governing Design Of Reinforced Earth Walls – Design Principles Of Reinforced Earth Walls.
GEOSYNTHETICS: Geotextiles- Types, Functions and Applications – Geogrids and Geomembranes – Functions and Applications.

UNIT - V EXPANSIVE SOILS:
Problems Of Expansive Soils – Tests for Identification – Methods of Determination Of Swell Pressure. Improvement Of Expansive Soils – Foundation Techniques in Expansive Soils – Under Reamed Piles.

TEXT BOOKS:
1. Engineering Principles of Ground Modification, Haussmann M.R. (1990), McGraw-Hill International Edition.
2. Ground Improvement Techniques by Dr.P.Purushotham Raj, Laxmi Publications, New Delhi / University Science Press, New Delhi
3. Ground Improvement Techniques by NiharRanajanPatra. Vikas Publications, New Delhi

REFERENCES:
1. Ground Improvement, Blackie Academic and Professional by Moseley M.P. (1993), Boca Taton, Florida, USA.
2. Ground Control and Improvement by Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994), John Wiley and Sons, New York, USA.
3. Designing with Geosynthetics by Robert M. Koerner, Prentice Hall New Jercy, USA

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Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												1	1
CO2	3												1	1
CO3	3													
CO4	3												1	1
CO5	3													

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Year: IV				Semester: I		

Subject Code	Subject Name	L	T	P	Credits
20APE0118	**Repair and Rehabilitation of structures**	3	0	0	3

Course outcomes:

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

CO 1: Understand the maintenance and causes of deterioration in structures

CO 2: Assess the damaged structures using NDT techniques

CO 3: Know about different types of repair materials

CO 4: Know the repair techniques for concrete structures

CO 5: Identify different types of strengthening techniques used for existing structures.

UNIT – I

Maintenance and Deterioration of structures

Maintenance, Repair and Rehabilitation - Facets of Maintenance, Importance of Maintenance-Distress in Structures – Causes of deterioration of structures - Construction and design errors- Causes and mechanism of corrosion in steel reinforcement

UNIT – II

Damage assessment

Visual inspection- Assessment procedure for evaluating a damaged structure- NDT for Strength assessment: rebound hammer test, Ultrasonic pulse velocity test and pull out test - NDT for Corrosion Potential Assessment:Half cell potential survey and Electrical Resistivity - NDT for Structural Integrity: Impact Echo Method and Acoustic Emission technique

Unit III

Repair materials

Essential parameters for repair materials- Polymer concrete- Expansive cement- Epoxy Resin-Sulphur Infiltrated Concrete-Fibre reinforced polymer - Corrosion control materials

UNIT IV

Repair techniques

Epoxy injection- Routing and sealing- Blanketing- External stressing- Stitching- Autogenous Healing - Dry packing- Prepacked concrete-Cathodic protection-Shotcrete- Repairs in under water structures

Unit V

Strengthening techniques

Strengthening techniques for structural members -Underpinning- Jacketing- Plate bonding- Fibre Wrap Technique- Composite construction- Post-Tensioning-Steel bracing

Text books

1. "Concrete Technology" A.R. Santakumar, Oxford University press.

2. "Maintenance Repair & Rehabilitation & Minor Works of Buildings" P.C. Varghese, PHI Learning Pvt. Ltd.

2. "Maintenance and Repair of Civil Structures", B.L. Gupta and Amit Gupta, Standard Publication

Reference books

1."Handbook on Repair and Rehabilitation of R.C.C Buildings", Central Public Works Department (CPWD), Government of India, New Delhi, 2002.

2. "Concrete Technology – Theory and Practice", M. S. Shetty, S. Chand and Company, 7th edn,.

3. "Design and Construction Failures", DovKaminetzky, Galgotia Publications Pvt. Ltd., 2001.

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Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3				2								2	2
CO3	3													
CO4	3											1		
CO5	3				2							2	2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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IV B.Tech   **I Semester**

Subject Code 20AOE9901	Subject Name **English For Research Paper Writing**	L T P 3 0 0	Credit: 3

Course Outcomes:

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

      CO1: Improve writing skills and level of readability.

      CO2: Learn what to write in each section, avoiding plagiarism.

      CO3: Understand the review of research literature

      CO4: Apply skills in writing a Title, abstract and literature

      CO5: Learn the skills of drafting Summations

Unit -1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences,

Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

Unit -2

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and

Plagiarism, Sections of a Paper, Abstracts, Introduction.

Unit -3

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit – 4

Key skills for writing a title– an abstract – an introduction – review of literature

Unit:5

Key skills for writing methodology – results – discussions – conclusions.

References:

1.Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3.Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4.AdrianWallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1										3				
CO2				3										
CO3				3										
CO4										3				
CO5										3				

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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IV B.Tech   **Semester: I**

Subject Code 20AHE9903	Subject Name Professional Communication	L 3	T 0	P 0	Credits: 3

Course Outcomes:

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

CO1: Identify and apply communication skills effectively for professional success.

CO2: Speak clearly and concisely in formal and in informal conversations.

CO3: Compose and communicate the information through drafting, editing and presentation.

CO4: Applying interpersonal skills in appropriate manner towards the growth of best career.

CO5: Construct sentence structures using correct vocabulary and without any grammatical errors.

Unit: 1- Grammar & Vocabulary

Parts of Speech - Articles - Prepositions - Subject-Verb agreement - Tenses - Active and Passive Voice - Direct & Indirect Speech - Degrees of Comparison - Punctuation -Vocabulary.

Unit: 2 - Communication Skills

Importance of Communication - Non-verbal Communication - Introduction to Kinesics, Proxemics, Chronemics - Basics of Technical Communication - Group Discussion, Interviews and Conversations.

Unit:3 – Telephone Skills:

Understanding Telephone Communication - Types of calls - Handling calls - Leaving a message - Making requests - Asking for and giving information - Giving Instructions - Making or changing appointments.

Unit:4 – Interpersonal Skills

Team management - Problem solving and Decision Making - Managing Time and Stress - Technology @ work - Etiquette.

Unit:5 – Written Communication

Email writing - Professional Letters - Letters of application, Business letters, Using Salutations, Routine letters, Request letters, Persuasive letters - Report writing - Note making - Notice, Agenda and Minutes of Meetings.

Suggested books for reading:

1. Meenakshi Raman, Sangeeta Sharma, Technical Communication – Principles and Practice, 3rd Edition, Oxford University Press, 2015.

2.Professional Communication Skills, Er A.K. Jain, Dr. Pravin S.R. Bhatia, Dr. A.M. Sheikh, S.Chand& Company Ltd, New Delhi, 2011.

3. Soft Skills for everyone, Jeff Butterfield, Cengage Learning India Private Ltd, New Delhi, 2014.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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Course structure for Four Year Regular B.Tech. Degree Program
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CIVIL ENGINEERING (CE)

4. Basic communication Skills P. KiranmaiDutt, GeethaRajeevan, Cambridge University Press India Pvt.

Ltd, New Delhi, 2010.

5. A Course in Communication Skils, P.KiranmaiDutt, GeethaRajeevan, CLN Prakash, Cambridge

University Press India Pvt Ltd, New Delhi, 2013.

Mapping of course outcomes with program outcomes

Course Outcomes COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		
CO2										2		
CO3										3		
CO4						3						
CO5										3		

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Skill Advanced Course

Laboratory's Code	Laboratory Name	L	T	P	Credits
20APC0129	Structural Analysis Design Software	1	0	2	2

COURSE OUTCOMES:

CO1: Analysis and Design of concrete structural elements for various loading conditions

CO2: Design of Foundations

CO3 : Analysis and Design of steel structural elements

SOFTWARE:

1. STAAD PRO and STAAD FOUNDATION

EXCERCISIES:

1. Analysis and Design of a Building with Dead and Live load configuration by Using Staad Pro.

2. Analysis and Design of a Building with Wind load configuration by Using Staad Pro.

3. Analysis and Design of a Building with Seismic load configuration by Using Staad Pro.

4. Design of Foundation by Using Staad Foundation

5. Analysis and Design of Circular Water Tank by Using Staad Pro.

6. Analysis of Ware House Steel Structure by Using Staad Pro.

Mapping of course outcomes with program outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1		3							2
CO2	3	3	3		3							2
CO3	3	3	2		3							2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Semester VIII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination(Max.Marks)		
				L	T	P	C	CIE	SEE	Total
1	MOOC (NPTEL) (12 Weeks)			3	0	0	3	25	75	100
2	Major Project	PROJ	Project Work	0	0	0	9	60	140	200
3	Internship(3Months)						3	100	-	100
	Total credits						15	185	215	400