

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
Ibrahimbagh, Hyderabad-31**

Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

**Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad**



**SYLLABUS BOOK FOR
B.E (CIVIL) III and IV SEMESTER
UNDER CBCS WITH EFFECT FROM 2020–2021
(For the students admitted in 2019-20)**



**DEPARTMENT OF CIVIL ENGINEERING
+91-40-23146010, 23146011
Fax: +91-40-23146090
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DEPARTMENT MISSION

"To strive for excellence in order to make the students better citizens with technical knowledge and social awareness"

DEPARTMENT VISION

"To impart knowledge in the latest technologies to the students of civil engineering to fulfil the growing needs of the society."

ACADEMIC RULE AND REGULATIONS

1. Attendance and Sessional marks requirements:

1	B.E(4yrs)	Attendance: Minimum aggregate attendance required to eligible to attend semester end exams is 75% and 65% with Medical Condonation respectively.
		Sessional Marks: Minimum aggregate of sessional marks required to become eligible for appearing semester end examinations is 40%

II. Promotion rules for B.E(4ydc) course

S.No	Semester/Class	Conditions to be fulfilled
1	I-SEM TO II- SEM	Regular course of study of I-SEM and 40% aggregate CIE marks in I-SEM
2	II-SEM TO III SEM	Regular course of study of II SEM and 40% aggregate CIE marks in II-SEM
		Must have secured at least 50% of total credits prescribed for I and II SEMs together
3	III-SEM to IV-SEM	Regular course of study of III-SEM and 40% aggregate CIE marks in III-SEM
		Regular course of study of IV SEM and 40% aggregate CIE marks in IV-SEM
4	IV-SEM to V-SEM	Passed in all the courses of I and II SEMs
		Must have secured at least 50% of total credits prescribed for III and IV SEMs put together
		Regular course of study of V-SEM and 40% aggregate CIE marks in V-SEM
		Regular course of study of VI SEM and 40% aggregate CIE marks in VI-SEM
5	VI-SEM to VII-SEM	Passed in all the courses of III and IV SEMs
		Must have secured at least 50% of total credits prescribed for V and VI SEMs put together
		Regular course of study of VII SEM and 40% aggregate CIE marks in VII SEM
		Regular course of study of VIII SEM and 40% aggregate CIE marks in VIII-SEM
6	VII-SEM to VIII-SEM	Regular course of study of VIII SEM and 40% aggregate CIE marks in VIII-SEM
7	Eligibility to appear VIII-SEM exams	Regular course of study of VIII SEM and 40% aggregate CIE marks in VIII-SEM
8		

III. Promotion rules for B.E(3 YDC) course (Lateral Entry)

S No	Semester/Class	Conditions to be fulfilled
1	III-SEM to IV-SEM	Regular course of study of III-SEM and 40% aggregate CIE marks in III-SEM
		Regular course of study of IV SEM 40% aggregate CIE marks in IV-SEM Must have secured at least 50% of total credits prescribed for III and IV SEMs put together
2	IV-SEM to V-SEM	Regular course of study V-SEM 40% aggregate CIE marks in V-SEM
3	V-SEM to VI-SEM	Regular course of study of VI SEM 40% aggregate CIE marks in VI-SEM Passed in all the courses of III and IV SEMs Must have secured at least 50% of total credits prescribed for V and VI SEMs put together
4	VI-SEM to VII-SEM	Regular course of study of VII SEM 40% aggregate CIE marks in VII SEM
5	VII-SEM to VIII-SEM	Regular course of study of VIII SEM and 40% aggregate CIE marks in VIII-SEM
6	Eligibility to appear VIII-SEM exams	

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-19)
B.E. – (CIVIL ENGINEERING) III-SEMESTER ACADEMIC YEAR 2020 - 2021
(Students Admitted in 2019-2020)

B.E (Civil) III Semester									
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination				
		Hours per Week			Duration in Hrs	Maximum Marks		Credits	
		L	T	P/D		SEE	CIE		
THEORY									
U19HS330EH	Skill Development Course-I: (Communication Skills-I)	2	-	-	3	60	40	2	
U19HS010EH	Human Values and Professional Ethics-I	1	-	-	2	40	30	1	
U19BS310MA	Partial Differential Equations & Transform Calculus	3	-	-	3	60	40	3	
U19BS310CE	Geology	2	-	-	3	60	40	2	
U19ES310EE	Basic Electrical Engineering for Civil Engineers	2	-	-	3	60	40	2	
U19PC310CE	Strength of Materials – I	3	-	-	3	60	40	3	
U19PC320CE	Surveying-I	3	-	-	3	60	40	3	
U19OEXXXXX	Open Elective-I	2	-	-	3	60	40	2	
U19MC310ME	Introduction to Entrepreneurship	1	-	-	2	40	30	-	
PRACTICALS									
U19BS311CE	Geology Lab	-	-	2	3	50	30	1	
U19ES311EE	Basic Electrical Engineering Lab for Civil Engineers	-	-	2	3	50	30	1	
U19PC321CE	Surveying - I Lab	-	-	2	3	50	30	1	
U19PC331CE	Computer Aided Drafting Lab	-	-	2	3	50	30	1	
Student should acquire one online course certificate equivalent to two credits during III-VII Semester									
TOTAL		19	-	8		700	460	22	
GRAND TOTAL		27				1160			
<i>Note: The left over hours are to be allotted to ECA -I / CCA-I / CC / RC / TC based on the requirement.</i>									

SERVICE COURSES OFFERED BY CIVIL ENGINEERING TO MECHANICAL ENGINEERING

B.E (Civil) III Semester									
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination				
		Hours per Week			Duration in Hrs	Maximum Marks		Credits	
		L	T	P/D		SEE	CIE		
THEORY									
U19ES310CE	Mechanics of Materials	3	-	-	3	60	40	3	
PRACTICALS									
U19ES311CE	Mechanics of Materials Lab	-	-	2	3	50	30	1	

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
SKILL DEVELOPMENT COURSE-I: (COMMUNICATION SKILLS-I)

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs/Week) : 2 hours	SEE Marks : 60	Course Code: UI9HS330EH
Credits: 2	CIE Marks : 40	Duration of SEE : Hours : 03

Course Overview:

Be it career or relationships, the harsh truth in today's global scene is that the future of any person is affected strongly by his//her communication skill in English. The four major skills of language learning, listening, speaking, reading and writing provide the right key to success.

Course Objective:

The main objective of this finishing school curriculum is to involve content for all the above mentioned four skills in teaching English and to get students proficient in both receptive and productive skills.

Overview of the delivery Methodology:

- Every Session will have activities on all the four skills.
- To personalize the learning a variety of case studies and structured problem solving activities will be given in small groups and the trainers will facilitate peer reviews.
- Integration of continuous grading (for assignment 1 and 2), instant feedback,(peer review sheets) clear goals, rewards (certificates and appreciation kits), have been included this time for positive reinforcement.
- The Writing and Reading exercises will be given in the workbook and will carry marks
- Vocabulary exercises will also be part of every session
- The Lateral entry students will be given a self study plan for language enhancement and will be given extra reading and writing exercises

Unit1 – Fundamentals of Communication

Unit Overview:

The module is an introductory module that covers the **fundamentals of communication**. This module is intended to enable the students to communicate using greetings and small sentences/queries.

Learning Outcome:

The students should be able to:

- Respond to questions
- Engage in informal conversations.
- Speak appropriately in formal situations
- Write formal and informal emails/letters

Competencies:

- Greeting appropriately
- Introducing themselves, a friend
- Reading and summarising the gist of a conversation
- Responding to simple statements and questions both verbally and in writing
- Writing an email with appropriate salutation, subject lines, introduction, and purpose of mail.
- Using appropriate vocabulary for both formal and informal situations
- Stating takeaways from a session or conversations

Sessions:

1. Introduction to Formal and Informal Conversations
2. Informal Conversations
3. Informal Conversations - Writing
4. Formal Conversations
5. Formal Conversations - Writing

Unit 2 - Narrations and Dialogues

Unit Overview:

The Module is intended to develop level of language competence that enables them to narrate and participate in casual dialogues.

Learning Outcome:

The students should be able to

- Narrate a message/story/incident, both verbally and in writing.
- Describe an event/a session/ a movie/ an article/image
- Understand Vocabulary in context

Competencies:

- Framing proper phrases and sentences to describe in context
- Reading Stories and articles and summarising the gist
- Speaking fluently with clarity and discrimination
- Listening for main ideas and reformulating information in his/her own words
- Drawing and write appropriate conclusions post reading a passage.
- Speaking Reading and Writing descriptive sentences and paragraphs
- Using appropriate tenses, adjectives and adverbs in conversations and written tasks

Sessions:

1. Recalling and Paraphrasing
2. Describing Present Events
3. Describing Past Events
4. Describing Future Events
5. Describing Hypothetical events

Unit 3 - Rational Recap

Unit Overview:

The module enables the participants to organize their communication, structure their speaking and writing, explain their thoughts/ideas, and summarize the given information.

Learning Outcome:

The students should be able to:

- Classify content and describe in a coherent form
- Recognize and list the key points in a topic/message/article.
- Compare and contrast using appropriate structure
- Explain cause and effect
- Understand the problem and solution framework
- Use appropriate transitions in their presentations and written assignments

Competencies:

- Organizing the communication based on the context and audience
- Structuring the content based on the type of information.
- Explaining a technical/general topic in detail.
- Writing a detailed explanation/process
- Recapitulating

Sessions:

1. Introduction to Mind maps
2. Classification
3. Sequencing
4. Description and Enumeration

Unit 4: Technical Expositions and Discussions

Unit Overview:

The module enables the students to build strategies for effective interaction and help them in developing decisive awareness and personality maintaining emotional balance.

Learning Outcome:

The students should be able to:

- Participate in technical and forum discussions by providing factual information, possible solutions, and examples.

Competencies:

- Comprehending key points of a topic and note main points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

Sessions:

1. Compare and Contrast
2. Cause and Effect
3. Problem and Solution

Unit 5: Drawing Conclusions

Unit Overview:

This module is intended to provide necessary inputs that enable the students to draw conclusions out of a discussion and provide reports.

Learning Outcome:

Students should be able to:

- Provide logical conclusions to the topics under discussion.

- Prepare, present, and analyze reports.

Competencies:

- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.
- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

Sessions:

1. Reasoning
2. Analyzing
3. Generalization and Prediction

Students are given workbooks prepared by Talent sprint.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:	90 Minutes			

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
HUMAN VALUES AND PROFESSIONAL ETHICS-I

SYLLABUS FOR B.E. III-SEMESTER

L:T: P (Hrs/Week):1	SEE Marks:40	Course Code: U19HS010EH
Credits: 1	CIE Marks:30	Duration of SEE:Hours:02

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to: -	On completion of this course the student will be able to :
1. Get a holistic perspective of value-based education.	1. Gain a world view of the self, the society and the profession.
2. Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations.	2. Start exploring themselves in relation to others and their work –constantly evolving into better human beings and professionals.
3. Understand professionalism in harmony with self and society.	3. Inculcate Human values into their profession.
4. Develop ethical human conduct and professional competence.	4. Obtain a holistic vision about value-based education and professional ethics.
5. Enrich their interactions with the world around, both professional and personal.	

UNIT-1 Understanding the need and process for Value Education

- a) Basic Human Aspirations -Philosophy, purpose & objective of Life Understanding and living in harmony at various levels-with self, family, society and nature.
- b) **Ethical and moral values** - Truth, honesty, empathy, integrity, consistency, cooperation, confidentiality, trustworthiness, self-respect, self-restraint, self-assertion, self-reliance.

UNIT-2 Holistic Understanding of Professional Ethics and Human Values

- a) At the level of individual: as socially and ecologically responsible engineers and technologists.
- b) At the level of society: as mutually enriching organizations, being work conscious.
- c) Recognizing the value of time and respecting time of self and others.

MODE OF DELIVERY

<ul style="list-style-type: none">• Questionnaires• Quizzes• Case-studies• Observations and practice• Home and classroom assignments	<ul style="list-style-type: none">• Discussions• Skits• Short Movies/documentaries• Team tasks and individual tasks• Research based tasks• Viva
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Relevant Websites,CD's and Documentaries

- Value Education website, <Http://www.universalhumanvalues.info>
- UPTU website, <Http://www.uptu.ac.in>
- Story of stuff, <Http://www.storyofstuff.com>
- AlGore, As Inconvenient Truth, Paramount Classics ,USA
- Charlie Chaplin, Modern Times, United Artists, USA
- IIT Delhi, Modern Technology-The Untold story-Anand Gandhi, Right Here Right Now, Cyclewala production.

Learning Resources:

1. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
2. B.L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
3. A.N Tripathy, 2003 Human values, New Age International Publishers.
4. EG Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	1	Max. Marks for each Internal Test	:	20
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:	90 Minutes			

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

**PARTIAL DIFFERENTIAL EQUATIONS & TRANSFORM
TECHNIQUES**

(Civil, EEE & Mechanical Branches)

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : U19BS310MA
Credits :3	CIE Marks :40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1 Study the Fourier series, conditions for expansion of function and half range series	On completion of the course, students will be able to 1 Expand any function which is continuous, Discontinuous, even or odd in terms of its Fourier series.
2 Formulate and understand linear and nonlinear partial differential equations.	2 Formulate the Partial differential equations by eliminating arbitrary constants and functions and solve linear, non linear Partial differential equations.
3 Study the applications of Partial Differential equations	3 Solve the one dimensional wave(Vibrations of a string), heat equations and two dimensional heat equations.
4 Understand the Definition of Laplace and inverse Laplace Transforms-Shifting Properties and various theorems and how to apply them in solving Differential Equations.	4 Evaluate Laplace transforms and inverse Laplace transforms of functions. Apply Laplace transforms to solve ordinary differential equations arising in engineering problems.
5 Study the concept of Fourier and inverse Fourier Transform of a function and various properties.	5 Determine Fourier transform, Fourier sine and cosine transform of a function.

UNIT-I: (14 Hours)

Laplace Transforms: Introduction to Laplace transforms - Inverse Laplace transform - Sufficient Condition for Existence of Laplace Transform –Properties of Laplace Transform- Laplace Transform of Derivatives - Laplace Transform of Integrals - Multiplication by t^n - Division by t – Evaluation of Integrals by Laplace Transforms- Convolution Theorem - Application of Laplace transforms to Initial value Problems with Constant Coefficients.

UNIT-II: (10 Hours)

Fourier series: Introduction to Fourier series – Conditions for a Fourier expansion – Functions having points of discontinuity – Change of Interval - Fourier series expansions of even and odd functions - Fourier Expansion of Half- range Sine and Cosine series.

UNIT-III: (10 Hours)

Fourier Transforms: Fourier Integral Theorem (without Proof) - Fourier Transforms – Inverse Fourier Transform - Properties of Fourier Transform – Fourier Cosine & Sine Transforms.

UNIT-IV: (10 Hours)

Partial Differential Equations : Formation of first and second order Partial Differential Equations - Solution of First Order Equations – Linear Equation - Lagrange's Equation - Non-linear first order equations – Standard Forms.

UNIT-V: (8 Hours)

Applications of Partial Differential Equations: Method of Separation of Variables - One Dimensional Wave Equation- One Dimensional Heat Equation – Two Dimensional Heat equation Laplace's Equation-(Temperature distribution in long plates).

Learning Resources:

1. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.

2. Higher Engineering Mathematics, Dr.B.S Grewal 40th Edition, Khanna Publishers.
3. Advanced Engineering Mathematics, Kreyszig E, 8 th Edition, John Wiley & Sons Ltd, 2006.
4. A text book of Engineering Mathematics by N.P.Bali & Manish Goyal, Laxmi Publication.
5. <http://tutorial.math.lamar.edu/Classes/DE/DE.aspx>
6. <http://mathworld.wolfram.com/topics>
7. <http://www.nptel.ac.in/course.php>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:		90 Minutes		

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
GEOLOGY

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):2 : 0 : 0	SEE Marks:60	Course Code: U19BS310CE
Credits : 2	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will:	Upon the completion of this course students will be able to:
<ol style="list-style-type: none">1. Describe the various properties of minerals, distinguishing features of rocks.2. Describe the geological structures, processes of weathering and classification of soils.3. Explain the process of ground water exploration.4. Illustrate the knowledge of geological studies for dams and reservoirs.5. Illustrate the knowledge of geological studies for tunnels, list the causes and effects of earth quakes, and landslides with their mitigation measures.	<ol style="list-style-type: none">1. Identify the different minerals and distinguishing features exhibited by the rocks2. Identify the geological structures like folds, faults, joints and unconformities present in rocks and describe the processes of weathering, classify and distribution of soils.3. Assess the occurrence of ground water in various lithological formations and location of bore wells.4. Evaluate the suitability of site for the dam construction.5. Evaluate the suitability of site for the tunnel construction, recognize the causes and effects of earth quakes, and landslides and suggest mitigation measures.

UNIT-I: Mineralogy: Definition of mineral and crystal, physical properties used in the identification of minerals, physical properties of quartz, feldspars, hornblende, biotite, muscovite, talc, olivine, calcite, kyanite and garnet.

Rocks: Textures and structures of igneous, sedimentary and metamorphic rocks. Geological description and Indian occurrence of granite, basalt, dolerite, gabbro, laterite, sandstone, shale, limestone, slate, gneiss, quartzite, marble.

UNIT-II: Geological Structures: Classification, mode of origin and engineering importance of folds, faults, joints and unconformities.

Rock Weathering: Processes and end-products of weathering. Susceptibility of rocks to weathering; assessment of the degree of weathering, tests of weatherability.

Geology of Soils: Formation of soils, soil profile, nature of parent materials, relative stability of minerals, geological classification of soils, types of Indian soils.

UNIT-III: Hydrogeology: Hydrological cycle, water table, aquifers, occurrence of ground water in various lithological formations. Ground water movement, springs. Ground water exploration.

UNIT-IV: Geology for Dams and Reservoirs: Types of dams. Dam foundations and reservoirs. Engineering and geological investigations for a masonry dam site; analysis of dam failures in the past. Engineering geology of major dam sites of India, Reservoir induced seismicity.

UNIT-V: Tunnels: Engineering geological investigations of tunnels in rock; Stand-up time of different rocks. Problems of tunnelling, pay line and over break, logging of tunnels, and geology of some well known tunnels.

Geological Hazards: Geological aspects of earthquakes and landslides.

Learning Resources:

1. Parbin Singh, Engineering and General Geology, S.K.Kataria & Sons, 2010.
2. Chennakesavulu N., Text Book of Engineering Geology, Macmillan India Ltd., 2009.
3. Gokhale K.V.G.K., Engineering Geology, B.S. Publishers, 2013.
4. Bell F.G., Fundamentals of Engineering Geology, Aditya Books Pvt. Ltd., 2007.
5. Krynine D.P. and Judd W. R., Principles of Engineering Geology and Geotechnics, CBS Publishers & Distributors, Indian Edition, 2005.
6. Subinoy Gangopadhyay, Engineering Geology, Oxford University Press, 2013.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:		90 Minutes		

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
STRENGTH OF MATERIALS–I

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):3:0:0	SEE Marks:60	Course Code: U19PC310CE
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will:	Upon the completion of course students will be able to:
<ol style="list-style-type: none">1. Examine and interpret basic concepts of Strength of materials and analyze statically determinate and indeterminate structures.2. Analyze simple beams subjected to various types of loading and plot shear force and bending moment diagrams and compute bending stresses.3. Define and analyze shear stresses in beams and plot shear stress distribution across cross section of beams4. Define and analyze problem of columns subjected to direct and bending stresses5. Define the concepts of compound stresses and strains in beams and also Investigate the behaviour of thin cylinder, spherical shells and thick cylinders	<ol style="list-style-type: none">1. Express understanding of the basic concepts and principles of Strength of materials and solve problems of composite sections, statically determinate and indeterminate structures.2. Construct shear force and bending moment diagrams for beams and compute stresses and strains in bending and shear in the cross section of beams subjected to transverse loading.3. Compute direct and bending stresses in columns and beams subjected to eccentric loading.4. Identify and interpret the governing equation for compound stress and strains and compute the principal stress and strains5. Compute stresses in thin cylinders, spherical shells and thick cylinders subjected to internal and external pressure.

UNIT-I: Simple Stresses and Strains: Definitions, types of stresses and strains. SI units, and notation. Hooke's law, modulus of elasticity, stress-strain curves for mild steel and typical engineering materials. Ductile and brittle materials. Working stress and factor of safety. Deformation of bars under axial loads; prismatic and non-prismatic bars. Deformations due to self-weight. Bars of uniform strength. Poisson's ratio; volumetric strain and restrained strains. Relationship between elastic constants. Compound bars

and temperature stresses. Statically indeterminate problems in tension and compression.

UNIT-II: Shear Force and Bending Moment: Definitions. Different types of beams and loads; shears force and bending moment diagrams for cantilever and simply supported beams with and without overhangs subjected to different types of loads viz., point loads, uniformly distributed loads, uniformly varying loads and couples. Relationship between loading, shear force and bending moment.

UNIT-III: Bending Stresses in Beams: Theory of simple bending. Moment of resistance, Elastic section modulus of section. Stresses in beams of various cross sections; flitched beams.

Shear Stresses in Beams: Distribution of transverse shear stresses over rectangular, circular, triangular, I- and T- sections.

UNIT-IV: Direct and Bending Stresses: Distribution of stresses over symmetrical sections under combined axial load and bending moment. Cores of solid and hollow circular and rectangular sections.

Compound stresses and strains: Principal stresses. Ellipse of stress. Mohr's circle for biaxial stresses. Principal strains. Introduction to failure theories.

UNIT-V: Thin Cylinders and spherical shells: Thin Cylinders subjected to internal fluid pressure; wire wound cylinders & shells

Thick Cylinders: Stresses under internal and external pressure. Compound cylinders.

Learning Resources:

1. Ferdinand P. Beer, E. Russell Johnston , John T. Dewolf, Mechanics of Materials, 2017.
2. Ramamrutham S., Narayanan R., Strength of Materials, Dhanpat Rai Publishing Company, New Delhi, 2011.
3. Bansal R.K., A text book of Strength of Materials, Laxmi Publications, New Delhi, 2010.
4. Rajput R.K., Strength of Materials, S.Chand Publications, New Delhi, 2006.
5. Junnarkar S.B., Mechanics of Structures (Vol-I & II), Charotar Publishing House, Anand, 2002.
6. Pytel and Singer F.L., Strength of Materials, Harper & Row, New York, 1999.

7. Subramanian R., Strength of Materials, Oxford University Press, 2010.
8. Hibbeler.R., Mechanics of Materials, Pearson Publishers, 2017.
9. Bhavikatti.S.S, Strength of Materials, Vikas Publishers, 2013.
10. NPTEL Course (www.nptel.ac.in)

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

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DEPARTMENT OF CIVIL ENGINEERING
SURVEYING - I

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):3:0:0	SEE Marks:60	Course Code: U19PC320CE
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will	Upon the completion of this course students will be able to
<ol style="list-style-type: none">1. Learn the basic concepts and use of surveying in Civil Engineering2. Understand the measurement techniques and equipment used in land surveying such as chain/tape, compass, plane table and level with respect to equipments used, methods, errors and analysis of data3. Acquire knowledge on use of theodolite, tacheometer and total station equipment, its adjustments, measurements, methods employed, errors and computation of data.	<ol style="list-style-type: none">1. Employ basic surveying operations and computations for measurement of distances and angles using chain/tape and compass for the given site conditions in field2. Identify the instruments used, and adopt the principles and methods involved in plane table surveying for plotting topographical features in field.3. Apply the principles of leveling to measure elevations of objects with respect to known points and prepare contour maps .4. Interpret the principles of measurement of angles with theodolite and total station, make traverse computations and identify omitted measurements in traverse and give solutions to such problems5. Determine the elevations and horizontal distances of any point on the surface of the earth using concepts of tacheometric surveying

UNIT-I: Introduction to Surveying: Plane and Geodetic surveying, Principle of surveying, Classification of surveys.

Chain Surveying: Principles of chain survey, Accessories and instruments employed in chain survey. Chain surveying concepts including ranging

Compass Surveying: Use and adjustment of prismatic compass. Methods of surveying with a compass, Bearing systems and conversions, Magnetic declination, Dip, local attraction. Errors in prismatic survey.

UNIT-II: Plane Table Surveying: Instruments employed in plane table survey and their use, importance of orientation and different methods of orientation, Various methods of plane table survey, Three-point and two-point problems

UNIT-III: Levelling: Definitions and principles of levelling, components of various levelling instruments, Use and adjustment of leveling instruments. Terms used in levelling, booking and reduction of levels. Establishment of bench marks by leveling. Longitudinal leveling, Cross-section leveling, Fly levelling, and Reciprocal leveling. Errors in levelling; curvature and refraction corrections.

Contouring: Definition and characteristics of contours, Direct and indirect methods of contouring, Interpolation of contours, Uses of contours.

UNIT-IV: Theodolite and Total station surveying: Introduction to theodolite and total station, Electronic distance measurement concepts, Measurement of horizontal and vertical angles, Measurement of distances, Introduction to total station – Concepts, capabilities and functions

Traversing and Computations: Methods of traversing, Checks in open and closed traverse, Computation of latitude and departures, consecutive and independent coordinates, closing error and its adjustment by Bowditch method, Transit rule and Graphical method. Gale's traverse table, omitted measurements in traverse and their computations. Errors in theodolite survey.

UNIT-V: Tacheometry: Fixed and movable hair tacheometers. Principle of stadia method, distance and elevation formula for staff held vertical and normal, instrumental constants, Anallactic lens, tangential method, use of subtense bar.

Learning Resources:

1. Punmia B.C., Ashok Kumar Jain, Arun Kumar Jain, Surveying, Vol. 1 and 2, Laxmi Publications, 2016.
2. Arora K.R., Surveying, Vol.1, 2 and 3, Standard Publishers Distributors, 2013.
3. Duggal S K, Surveying Volume 1, Fourth edition, Mc. Graw Hill Education Pvt Ltd 2013.
4. David Clark, Plane and Geodetic Surveying for Engineers, Vol.1 and 2, CBS Publishers and Distributors Pvt. Ltd, 2004.
5. Kanetker T.P. and Kulkarni S.V., Surveying and Levelling, Pune Vidyarthi Gruha Prakshan, Pune, 2014.
6. Venkatramaiah C., A Text Book of Surveying, University Press, Hyderabad, 2011.

7. NPTEL Course (www.nptel.ac.in)

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR BE III SEMESTER

INTRODUCTION TO ENTREPRENEURSHIP

Instruction : 1 Hour/week	SEE Marks : 40	Course Code : U18MC310ME
Credits : 0	CIE Marks : 30	Duration of SEE : 2 Hours

Course Objectives	Course Outcomes
1. The objectives of this course is to inspire students develop an entrepreneurial mind-set, educate about the resources and schemes available to start enterprises in India.	On completion of the course, the student will be able to:
	1. Demonstrate awareness about entrepreneurship and potentially be an entrepreneur.
	2. Generate and analyse the business ideas.
	3. Know about the supporting organizations available to establish the business in the country.
	4. Prepare a business plan.

Unit-I: Introduction to Entrepreneurship: Entrepreneurial characteristics, classification of enterprises, forms of business organizations, role of entrepreneurship in economic development, start-ups.

Idea Generation and Opportunity Assessment: Ideas in entrepreneurship, sources of new ideas, techniques for generating ideas, opportunity recognition, steps in tapping opportunities.

Unit-II: Institutions Supporting Small Business Enterprises: Central level Institutions: NABARD, SIDBI, NIC, KVIC, NIESBUD, SIDO, DST, EDI, FICCI, CII, ASSOCHAM etc., State level institutions: DICs, SFC, SIDC, etc., Other financial assistance.

Entrepreneurial skills, design thinking, selling and communication, project formulation and appraisal, preparation of project report, guidelines for report preparation, pitching of a potential venture.

Learning Resources:

1. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship: successfully launching new ventures", 3rd edition, Pearson Prentice Hall, 2009.
2. P. Denning and R. Dunham, "The Innovator's Way", MIT Press: Cambridge, Massachusetts, 2010.
3. Arya Kumar, "Entrepreneurship", Pearson Education, Delhi, 2012.
4. Michael H. Morris, D.F.Kuratko, J G Covin, "Corporate Entrepreneurship and Innovation", Cengage learning, New Delhi, 2010
5. Peter F. Drucker, "Innovation and Entrepreneurship", Routledge Classics, 2015.
6. Eric Ries, "The Lean Start-up", Currency, 1st edition, 2011.
7. <http://www.learnwise.org>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests:	1	Max. Marks for each Internal Test:	20
2	No. of Assignments:	1	Max. Marks for each Assignment:	5
3	No. of Quizzes:	1	Max. Marks for each Quiz Test:	5

Duration of Internal Test: 60 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
GEOLOGY LAB

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):0:0 :2	SEE Marks:50	Course Code: U19BS311CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	Upon the completion of this course the students will be expected to:
<ol style="list-style-type: none">1. Familiarize with the procedures for the identification of minerals, rocks and structural models.2. Calculate the specific gravity, porosity and water absorption in rocks.3. Operate electrical resistivity meter and seismic timer.4. Describe the various types of maps.5. Measure the attitude of beds and draw the sections for geological maps.	<ol style="list-style-type: none">1. Identify the physical properties of minerals, rocks and various structural features like folds, faults and unconformities.2. Calculate the specific gravity, porosity and water absorption in rocks, operate electrical resistivity meter and seismic timer, study of various types of maps.3. Draw the sections for the geological maps pertaining to the study of folds, faults and unconformities.4. Practise working as a team member and lead a team5. Demonstrate professional behaviour in conducting the experiments and present the results effectively

LIST OF EXPERIMENTS

1. Identification and description of physical properties of minerals.
2. Identification and description of geotechnical characteristics of rocks.
3. Determination of apparent specific gravity, porosity and water absorption of different rocks; IS:1124 - 1974.
4. Study of structural models; folds, faults and unconformities.
5. Measurement of strike and dip of joints in granites using clinometer compass.
6. Study of geological and geotechnical maps of Telangana, Andhra Pradesh and India.
7. Study of Topographic maps.
8. Study of maps and sections pertaining to the study of folds, faults and unconformities.
9. Vertical electrical sounding.

10. Seismic refraction survey

No. of Internal Tests:	1	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test:	2 Hours		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
SURVEYING-I LAB

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):0:0:2	SEE Marks:50	Course Code: U19PC321CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	Upon the completion of this course students will be able to
1. Develop skills for applying classroom knowledge to field problems and handling of surveying tools such as chain, compass, level, plane table and theodolite.	1. Locate the objects, measure the distances and area and transfer the same on to the drawings 2. Use conventional surveying tools such as chain, compass, level, plane table and theodolite in the field of civil engineering applications such as structural plotting and highway profiling 3. Practice working as a team member and lead a team 4. Plan a survey appropriately with the skill to understand the surroundings 5. Demonstrate professional behaviour in conducting the experiments and present the results effectively

LIST OF EXPERIMENTS

1. Practice of direct and indirect ranging and measuring the distance using Chain.
2. Traversing by using Compass – plotting and adjustments.
3. Plane table surveying - Radiation and Intersection methods.
4. Plotting of the traverse for the given area using plane table.
5. Reduction of levels by Height of Instrument (HI) & Rise and fall method.
6. Profile leveling using auto level - Plotting Longitudinal section and Transverse sections
7. Contour surveying and plotting using Grid method.
8. Measurement of horizontal angle using repetition & Reiteration methods.
9. Measurement of vertical angle; Application to simple problems of height and distance using angle of elevation and depression.

10. Transverse using of theodolite - Distribution of errors using Gales traverse table.
11. Demonstration of minor surveying instruments

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test:	2 Hours		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
COMPUTER AIDED DRAFTING LAB

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):0:0:2	SEE Marks:50	Course Code: U19PC331CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>Objectives of this course are to:</i>	<i>Upon the completion of this course students will be able to</i>
<ol style="list-style-type: none"> Develop skills to generate civil engineering drawings using a drafting software. Learn various tools and functions of the drafting software. 	<ol style="list-style-type: none"> Understand functional planning & orientation of the buildings. Navigate the drafting software user interface. Learn basic tools of the software. Apply the fundamental features of drafting software in a practical situation. Prepare civil engineering drawings in a detailed and visually impressive way.

LIST OF EXPERIMENTS

- Building Planning & Orientation:** Functional planning of buildings and Orientation of the building for ventilation.
- CAD:** Introduction to Computer Aided Drafting, Advantages and Disadvantages of CAD, List of CACED Software. Introduction and feature of drafting software.
- Environment of drafting software:** Workspace, Application Menu, Quick Access Toolbar, Ribbon, Search for information, Pull-down menu, Status bar, Function keys.
Coordinate systems: absolute and relative, Cartesian and polar coordinate systems.
- Basic Managing/ Display control Tools:** New, Save, new, Open, Close, Quit/ Exit, Undo, Redo, Limits, Units, Zoom, Pan, Steering Wheel, View Cube etc.
Basic Drafting Tools: Line, Polylines, Point, Circle, Arc, Spline, Ellipse, Rectangle, Polygons, Text, Hatch.

5. **Editing/ Inquiry Tools:** Erase, oops, Move, Copy, Mirror, Rotate, Scale, Fillet, Chamfer, Trim, Extend, Break, Join, Stretch, Offset, Array, Distance, Radius, Angle, Area, Volume.

6. **Dimensioning Tools:** Linear, Aligned, Radius, Diameter, Centre, Angular, Baseline, Continuous, Ordinate, Arc Length, Jogged Radius Dimension, Dimension Space, Dimension Break, Inspection Dimension, Multileader and its Style.

7. **Layer Tools:** Concepts and use of Layers in drafting software, drawing, Adding New layers, Editing and Managing Layers, List Properties, Use of Different Types of lines and their weightages.
Block/Wblock and Attributes: Concept and Significance of Blocks in drafting software Drawings, Creating Blocks, Editing and Managing Blocks

8. Drawing of Plans, Elevations and Sections of various types of single Storey Residential Buildings.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test:	2 Hours		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
MECHANICS OF MATERIALS

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: U19ES310CE
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will	Upon the completion of this course students will be able to
<ol style="list-style-type: none">1. Learn the analysis of members subjected to axial and transverse loads.2. Assess the behavior of columns subjected to axial loads and compute stresses in beams due to bending.3. Analyse the stresses developed in shafts, springs due to torsion and internal pressure in cylinders.	<ol style="list-style-type: none">1. Analyse members subjected to axial loads including thermal effects using basic concepts of Mechanics of materials.2. Draw shear force and bending moment diagrams in statically determinate beams.3. Compute stresses and strains in bending, shear and principal stresses.4. Determine the deflection of statically determinate beams subjected to UDL and point loads using double integration method and apply Euler's theory for long columns.5. Compute stresses in circular shafts for torsion, springs subjected to axial load and stresses induced in cylinders.

UNIT-I: Stresses and Strains: Definitions, types of stresses and strains. Elasticity and plasticity. Hooke's law. stress-strain diagrams for engineering materials. Modulus of elasticity. Poisson's ratio. Relationship between elastic constants. Linear and volumetric strains. Bars of uniform strength. Temperature stresses. Compound bars.

UNIT-II: Shear Force and Bending Moment: Bending moment and shear force diagrams for cantilever, simply supported beams and beams with overhangs carrying point and uniformly distributed loads. Relationship between intensity of loading, shear force and bending moment.

UNIT-III:Stresses in Beams: Simple theory of bending. Moment of resistance. Modulus of section. Distribution of shear stresses in rectangular, I- and T-, standard steel and hollow sections. Compound stresses, principal stresses and strains. Mohr's circle of stress.

UNIT-IV:Deflections: Slope and deflections by the method of double integration in cantilever, simply supported beams and beams with over hangs subjected to point loads and uniformly distributed loads.

Columns: Euler's theory of long columns with axial load.

UNIT-V: Torsion: Derivation of torsion formula for circular sections. Torsional stresses, angle of twist, power transmission, effect of combined bending and torsion. Close coiled helical springs with axial load.

Cylinders: Stresses in thin and thick cylinders with internal and external pressures. Hoop and longitudinal stresses. Stresses in compound cylinders.

Learning Resources:

1. Ferdinand P. Beer, E. Russell Johnston , John T. Dewolf, Mechanics of Materials, 2017.
2. Ramamrutham S., Narayanan R., Strength of Materials, Dhanpat Rai Publishing Company, 2011.
3. Bansal R.K., A text book of Strength of Materials, Laxmi Publications, 2010.
4. Rajput R.K., Strength of Materials, S.Chand Publications, 2006.
5. Junnarkar S.B., Mechanics of Structures (Vol-I & II), Charotar Publishing House, Anand, 2002.
6. Pytel and Singer F.L., Strength of Materials, Harper & Row, New York, 1999.
7. Subramanian R., Strength of Materials, Oxford University Press, 2010.
8. Hibbeler.R., Mechanics of Materials, Pearson Publishers, 2017
9. Bhavikatti.S.S, Strength of Materials, Vikas Publishers, 2013

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
MECHANICS OF MATERIALS LAB

SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week) 0 : 0 : 2	SEE Marks:50	Course Code: U19ES311CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>In this subject the students will</i>	<i>Upon the completion of this course students will be able to</i>
<ol style="list-style-type: none">1. Determine the properties of materials under the action of various loads.2. Learn the ability to work in a team and make effective presentations.	<ol style="list-style-type: none">1. Determine Young's Modulus of materials of beams by conducting deflection test.2. Assess the quality of materials by conducting hardness test and impact test and also learn the operation of universal testing machine (UTM).3. Determining modulus of rigidity of materials by conducting torsion test and spring test.4. Practise working as a team member and lead a team.5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively.

List of Experiments

1. Determination of Young's modulus by conducting Deflection test on Cantilever beam
2. Determination of Young's modulus by conducting Deflection test on Simply supported beam
3. Izod Impact test
4. Direct tension test on metal rods
5. Brinnell and Rockwell Hardness test
6. Compression test on brittle and ductile materials
7. Determination of modulus of rigidity by conducting tension test on a helical spring
8. Determination of modulus of rigidity by conducting compression test on a helical spring
9. Determination of modulus of rigidity by conducting torsion test

10. Determination of modulus of elasticity by conducting deflection test on fixed beam
11. Determination of modulus of elasticity by conducting deflection test on continuous beam
12. Bend test on metal rod.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test:	2 Hours		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
MECHANICS FOR ENGINEERS
(Civil, Mech., & EEE)

SYLLABUS FOR BRIDGE COURSE B.E. III-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:50	Course Code:U19MC310CE
Credits : - - -	CIE Marks: - -	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will	Upon the completion of this course students will be able to
1. To learn the resolution of a system of spatial forces. 2. To assess the frictional forces on rigid body. 3. To understand the concepts of dynamics and its principles. 4. To explain kinetics and kinematics of particles, projectiles, curvilinear motion and centroidal motion. 5. To impart the concepts of work-energy method and its applications to rectilinear translation, centroidal motion.	1. Judge whether the body under the action of spatial force system. 2. Solve problem of bodies subjected to friction. 3. Distinguish between statics and dynamics and differentiate between kinematics and kinetics. 4. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear motion. 5. Know the concepts of work and energy principles subject and derive the work energy equations for translation and connected systems.

UNIT-I: Force Systems: Components of forces, moments in space and its applications.

UNIT-II:Friction: Laws of friction, application to simple systems and wedge friction.

UNIT-III: Kinematics: Rectilinear motion, curvilinear motion, velocity and acceleration of a particle.

UNIT-IV: Kinetics: Analysis as a particle, analysis as a rigid body in translation.

UNIT-V: Work Energy: Principles of work energy and its application to translation, particle motion and connected systems.

Learning Resources:

1. Singer F.L., "Engineering Mechanics", Harper & Collins, Singapore, 2010.
2. Timoshenko S.P. and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 2014.
3. Andrew Pytel, Jaan Kiusalaas., "Engineering Mechanics", Cengage Learning, 2014.
4. Beer F.P. and Johnston E.R., "Jr. Vector Mechanics for Engineers", TMH, 2004.
5. Hibbeler R.C. & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
6. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
7. Basudeb Bhattacharyya., "Engineering Mechanics", Oxford University Press, 2008.
8. Meriam. J. L., "Engineering Mechanics", Volume-I Statics, John Wiley & Sons, 2008.
9. NPTEL Course (www.nptel.ac.in)
10. Virtual labs (www.vlab.co.in)

**OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN
B.E. III SEMESTER (2020-21)**

Dept	Title	Code	credits
CSE	Fundamentals Of Scripting Language	U19OE310CS	2
CSE	Cyber Security	U19OE320CS	2
ECE	Basics Of Electronic Communication	U19OE320EC	2
EEE	Non Conventional Energy Sources		2
IT	Fundamentals of Data Structures	U19OE310IT	2
IT	Introduction to Linux	U19OE320IT	2
Mech.	Geometric Modelling	U19OE310ME	2
Mech.	Basic Heat Transfer For Electronic Systems	U19OE330ME	2
Maths	Linear Algebra And Its Applications	U19OE310MA	2
Chemistry	Battery science and Technology	U20OE310CH	2
Chemistry	Corrosion science and it's application	U20OE320CH	2
Physics	Smart Materials & Applications	U20OE310PH	2

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

FUNDAMENTALS OF SCRIPTING LANGUAGE (OPEN ELECTIVE-I)

(Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E. III-SEMESTER

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U190E310CS
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Acquire problem solving skills 2. Learn programming and solve problems using Python language	On completion of the course, students will be able to 1. Design python programs using arithmetic expressions and decision making statements 2. Design modular python programs using functions 3. Develop programs using strings and list 4. Develop programs using tuples and dictionaries

UNIT-I: Introduction to Python: Variables, expressions and statements, order of operations

Conditionals: Modulus operators, Boolean expressions, logical operators, conditional execution, alternative executions, chained conditional, nested conditional

Iteration: while statement

UNIT-II: Functions: function calls, type conversion and coercion, mathematical functions, User-defined functions, parameters and arguments. Recursion

UNIT-III: Strings: string length, string traversal, string slices and string comparison with examples, strings are immutable, find function, string module

List: list values, accessing elements, list traversal, list length, list membership, list and for loop, list operations with examples

UNIT-IV: Tuples: Mutability, tuple assignment, tuple as return values

Dictionaries: dictionary operations, dictionary methods, aliasing and copying, counting letters using dictionaries

Learning Resources:

1. Downey A, How to think like a Computer Scientist :Learning with Python, 1st Edition(2015), John Wiley
2. Lambert K.A, Fundamentals of Python –First Programs, 1st Edition(2015), Cengage Learning India
3. Perkovic L, Introduction to Computing using Python,2/e, (2015), John Wiley
4. Stewart Venit and Elizabeth Drake, Prelude to Programming: Concepts and Design, 6th Edition(2015),Pearson India
5. Mark J Guzdial, Introduction to Computing and programming in Python, 3rdEdition(2013), Pearson India
6. Allen Downey, Think Python, 2nd Edition(2015),Shroff Publisher Orielly
7. <http://nptel.ac.in/courses/117106113/34>
8. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/python-tutorial/>
9. www.scipy-lectures.org/intro/language/python_language.html

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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|--------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| 1. No. of Internal Tests | : <input type="text" value="2"/> | Max. Marks for each Internal Test | : <input type="text" value="30"/> |
| 2. No. of Assignments | : <input type="text" value="2"/> | Max. Marks for each Assignment | : <input type="text" value="5"/> |
| 3. No. of Quizzes | : <input type="text" value="2"/> | Max. Marks for each Quiz Test | : <input type="text" value="5"/> |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CYBER SECURITY (OPEN ELECTIVE-I)

(Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E. III-SEMESTER

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U190E320CS
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To safeguard from threats and infection spread through the internet	On completion of the course, students will be able to 1. Explain the concepts of confidentiality, availability and integrity 2. Explain the basics of fraud techniques used by a hacker 3. Explore the common exploitation mechanisms and inspect data sniffing over the network 4. Determine the ways an organization attempts to discover threats.

UNIT-I: CYBER SECURITY FUNDAMENTALS: Network and Security concepts: Information assurance fundamentals, Basic Cryptography, Symmetric Encryption, Public key encryption, Digital Signature, Key Exchange Protocols, DNS, Firewalls, Virtualization.

UNIT-II: ATTACKER TECHNIQUES AND MOTIVATIONS: How hackers cover their tracks, Tunneling techniques, Fraud Techniques: Phishing, Smishing, Vishing and Mobile Malicious Code, Rogue Antivirus, Click Fraud, Threat Infrastructure: Botnets, Fast-Flux, Advanced Fast-Flux.

UNIT-III: EXPLOITATION: Techniques to gain foothold: Shellcode, Integer overflow, Stack based buffer overflow, Format String Vulnerabilities, SQL Injection, Web Exploit Tools, Misdirection, Reconnaissance, and Disruption Methods

UNIT-IV: MALICIOUS CODE, DEFENSE & ANALYSIS TECHNIQUES: Self-replicating replicating code, Worms, Viruses, Evading Detection and Elevating Privileges: Obfuscation, Spyware, Token Kidnapping, Memory

Forensics, Honey pots, Malicious code naming, Intrusion detection systems

Learning Resources:

1. James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", Auerbach Publications, CRC Press, 2011
2. Mike Shema, "Anti-Hacker Tool Kit (Indian Edition)", Mc Graw Hill, 2014
3. Cyber Security - Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and SunitBelpure, Publication Wiley, 2011
4. <https://www.edx.org/micromasters/ritx-cybersecurity>
5. <https://www.coursera.org/specializations/cyber-security>
6. <http://nptel.ac.in/courses/106105031/>
7. <https://www.netacad.com/courses/security/introduction-cybersecurity>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

- | | | | |
|--------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| 1. No. of Internal Tests | : <input type="text" value="2"/> | Max. Marks for each Internal Test | : <input type="text" value="30"/> |
| 2. No. of Assignments | : <input type="text" value="2"/> | Max. Marks for each Assignment | : <input type="text" value="5"/> |
| 3. No. of Quizzes | : <input type="text" value="2"/> | Max. Marks for each Quiz Test | : <input type="text" value="5"/> |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BASICS OF ELECTRONIC COMMUNICATION (OPEN ELECTIVE)

SYLLABUS FOR B.E. III – SEMESTER (for EEE, CSE & IT)

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U19OE320EC
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	On completion of the course, students will be able to
<ol style="list-style-type: none">1. Distinguish analog and digital Modulation techniques used in various Communication systems.2. Explain why multiplexing methods are necessary in communications and compare FDM with TDM.	<ol style="list-style-type: none">1. Analyze the power and transmission bandwidth of Amplitude and Frequency Modulated signals.2. Understand the process of reproduction of base band signal.3. Analyze various pulse analog and pulse digital Modulation Techniques.4. Compare and contrast various Multiplexing techniques used in Communication systems.5. Detect and correct errors present in bit stream data using parity check method.

UNIT – I

Amplitude Modulation: Introduction to Modulation, Need for Modulation, Ordinary Amplitude Modulation – Modulation index, Side bands, AM Power, Double Side Band Suppressed Carrier Modulation, Single Side Band Modulation, Vestigial Side Band Modulation, Applications of AM

UNIT – II

Angle Modulation: Angle Modulation fundamentals, Frequency Modulation – Modulation index and sidebands, Narrowband FM, Wideband FM, Principles

of Phase Modulation, Frequency Modulation verses Amplitude Modulation, Applications of FM.

UNIT – III

Signal Sampling and Analog Pulse Communication: Ideal Sampling, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation.

Digital Communication Techniques: Quantization, Digital Transmission of Data, Parallel and Serial Transmission, Data Conversion, Pulse Code Modulation, Delta Modulation.

UNIT – IV

Transmission of Binary Data in Communication Systems: Digital Codes, Principles of Digital Transmission, Transmission Efficiency, Modem Concepts and Methods – FSK, BPSK, Error Detection and Correction.

Learning Resources :

1. Louis E. Frenzel, Principles of Electronic Communication Systems, 3rd Edition. Tata Mcgraw Hill.
2. Wayne Tomasi, Electronic Communications Systems, 5th Edition, Pearson Education.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

- | | | | |
|--------------------------|-----|-----------------------------------|------|
| 1. No. of Internal Tests | : 2 | Max. Marks for each Internal Test | : 30 |
| 2. No. of Assignments | : 2 | Max. Marks for each Assignment | : 5 |
| 3. No. of Quizzes | : 2 | Max. Marks for each Quiz Test | : 5 |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF INFORMATION TECHNOLOGY

FUNDAMENTALS OF DATA STRUCTURES (Open Elective-I)

SYLLABUS FOR B.E. III-SEMESTER (for other Branches)

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U19OE310IT
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Explore efficient storage mechanisms for easy access, design and implementation of various data structures.	On completion of the course, students will be able to <ol style="list-style-type: none">1. Identify appropriate linear data structure to solve a problem.2. Illustrate the usage of linked lists for various applications3. Demonstrate the usage of non-linear data structures – graphs & trees

UNIT – I:

Introduction to Data Structures: Performance Analysis: Time and Space complexity.

Introduction to Data Structures: Stacks, Representation of a Stacks using Arrays, Applications.

Queues: Representation of a Queue using array ,Applications.

UNIT – II:

Linked List: Introduction, Singly Linked list ,Operations on a Singly linked list, Dynamically Linked Stacks and Queues.

UNIT – III:

Doubly linked list: Introduction, Doubly linked list, Operations on a doubly linked list.

UNIT – IV:

Introduction to Non-Linear Data Structures: Trees and Graphs

Learning Resources :

1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2/e, Universities Press, 2008
2. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 1996
3. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla , — Data Structures and Program Design in C, Second Edition, Pearson Education, 2007
4. Jean-Paul Tremblay, Paul G. Sorenson, 'An Introduction to Data Structures with Application', TMH, 2nd Edition.
5. Richard F, Gilberg, B.A. Forouzan, "Data Structures, A Pseudocode Approach with C", Cengage, 2nd Edition
6. <http://nptel.ac.in/courses/106106127/>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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|--------------------------|---|--------------------------------|-----------------------------------|---|---------------------------------|
| 1. No. of Internal Tests | : | <input type="text" value="2"/> | Max. Marks for each Internal Test | : | <input type="text" value="30"/> |
| 2. No. of Assignments | : | <input type="text" value="2"/> | Max. Marks for each Assignment | : | <input type="text" value="5"/> |
| 3. No. of Quizzes | : | <input type="text" value="2"/> | Max. Marks for each Quiz Test | : | <input type="text" value="5"/> |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO LINUX (Open Elective – I)

SYLLABUS FOR –III SEMESTER

(Common for CIVIL, ECE, EEE & MECH)

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U19OE320IT
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Acquire basic skills for using Linux operating system.	On completion of the course, students will be able to: <ol style="list-style-type: none">1. Install Linux operating system and use desktop environment.2. Identify and use Linux utilities to create and manage simple file processing operations.3. Organize directory structures with appropriate security.4. Configure and use Linux shell.

UNIT – I:

Introduction to Linux, Installing Linux, Running Linux from USB Drive, Understanding X Windows System and Desktop, Navigating through Linux Desktop and Managing files. Understanding Linux file system, listing files and directory attributes, Making files and directories, Listing and changing permissions and ownership.

UNIT – II:

Understanding the Linux Shell, Understanding aliases, Using the shell from console or terminals, using command history and tab completion, Connecting and expanding commands, Creating aliases, Making shell settings permanent, Using man pages and other documentation.

UNIT – III:

Introduction to Shell Scripting: Reading input from the user, logical operators, Arithmetic operators, Environment variables, Read-only variables, command line arguments, working with arrays.

UNIT – IV:

Decision Making: Conditional constructs, Functions: Introduction to functions, passing arguments, sharing of data, declaration of local variables, returning information from functions, running functions in the background, creating a library of functions

Learning resources:

1. Introduction to Linux – A Hands On Guide, MachteltGarrels.
2. Ganesh SanjivNaik, Learning Linux Shell Scripting, Packt Publishing, 2015. Open Source Community
3. <https://linuxjourney.com/>
4. <https://nptel.ac.in/courses/117106113/>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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|--------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| 1. No. of Internal Tests | : <input type="text" value="2"/> | Max. Marks for each Internal Test | : <input type="text" value="30"/> |
| 2. No. of Assignments | : <input type="text" value="2"/> | Max. Marks for each Assignment | : <input type="text" value="5"/> |
| 3. No. of Quizzes | : <input type="text" value="2"/> | Max. Marks for each Quiz Test | : <input type="text" value="5"/> |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

Department of Mechanical Engineering

GEOMETRIC MODELLING (Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U19OE310ME
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The objective of this course is to understand wire-frame modelling & transformations, surface, solid modelling and assembly modelling techniques.	On completion of the course, students will be able to 1. define various geometric modelling techniques and development of wire frame modelling for synthetic entities by using mathematical equations. 2. formulate 2D transformations for geometric model by matrix approach. 3. development of various surfaces using surface modelling. 4. development of solid models using various solid modelling schemes and Study various Assembly constraints, Assembly tree and develop few assembled models.

UNIT-I: INTRODUCTION TO CAD

product life cycle, conventional design and computer aided design.

Wire Frame Modelling: wire frame entities and their definitions. Interpolation and approximation of curves. Concept of parametric and non-parametric representation of circle and helix curves, demonstration of 2D geometry through CAD software.

UNIT-II: SYNTHETIC CURVES

Parametric representation of cubic spline, Bezier and B-spline curves, continuity, properties and characteristics of splines. Concepts of NURBS, synthetic curves demonstration.

2D transformation and their mathematics: Translation, scaling, rotation, Homogeneous co-ordinates, Concatenated transformations.

UNIT-III: SURFACE MODELING

Analytical surfaces: Definitions of planar, surface of revolution, Tabulated cylinder. Synthetic surfaces: Cubic and Bezier surfaces, visualization of different surfaces.

UNIT-IV: SOLID MODELLING

C– rep and B– rep and feature instancing, Octree encoding, spatial enumeration, cell decomposition, sweeping approaches. Euler's representation of solid models, creation of solid model in CAD software.

ASSEMBLY MODELING: Assembly constraints, assembly tree, top down assembly, bottom up assembly, development of a history tree for a simple assembly, demonstration of simple assembly.

Learning Resources:

1. Ibrahim Zeid, "CAD/CAM- Theory and Practice", McGraw-Hill Inc. New York, 2011.
2. Steven Harrington, "Computer graphics: a programming approach", McGraw-Hill, 1987.
3. David Rogers, J. Alan Adams, "Mathematical elements for computer graphics", McGraw Hill, 1990.
4. McConnell, J. J. "Computer graphics theory into practice", Jones and Bartlett Publishers, 2006.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 2	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 2	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

Department of Mechanical Engineering

BASIC HEAT TRANSFER FOR ELECTRONIC SYSTEMS (Open Elective-I)

SYLLABUS FOR B.E.III-SEMESTER

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U19OE330ME
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
On completion of the course, students will be able to	
The objective of this course is to study the basic laws of thermodynamics and the cooling of electronic equipment along with basic modes of heat transfer	<ol style="list-style-type: none">1. understand and apply the first law of thermodynamics to various engineering problems2. understand and apply the second law of thermodynamics to various engineering problems3. formulate heat conduction problems in rectangular, cylindrical and spherical coordinate system by transforming the physical system into a mathematical model.4. analyse heat transfer processes involved in cooling of electronic components

UNIT-I: INTRODUCTION TO THERMODYNAMICS

Basic Concepts-System, Types of Systems, Control Volume, Surrounding, Boundaries, Universe, Macroscopic and Microscopic viewpoints, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi–static process; Zeroth Law of Thermodynamics. Energy in state and in transition-Work and Heat. PMM I – Joule’s Experiment – First law of Thermodynamics, First law applied to – process.

UNIT-II: SECOND LAW OF THERMODYNAMICS

Limitations of the First Law; Second Law of Thermodynamics- Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM II, Carnot cycle and its specialties, Clausius inequality, introduction to entropy.

UNIT-III: HEAT TRANSFER

Heat Transfer – Different Modes, governing laws and application to heat transfer: Fourier, Newton, Stefan–Boltzmann laws; general heat conduction equation: Cartesian co-ordinates (derivation), Steady state one-dimensional heat conduction through slabs, hollow cylinders and spheres (numericals); Concept of thermal resistance in series and parallel (composite systems), overall heat transfer coefficient; Critical radius of insulation: concept, derivation and numerical: with and without internal heat generation.

UNIT-IV: INTRODUCTION TO COOLING OF ELECTRONIC EQUIPMENT

Needs & Goals; Temperature effects on different failure modes; Electronic equipment for airplanes, missiles, satellites and spacecraft; electronic equipment for ships & submarines; electronic equipment for communication systems and ground support system; chassis and circuit boards cooling.

Learning Resources:

1. P.K. Nag, "Engineering Thermodynamics", Tata Mc Graw Hill, 4th Edition, 2008.
2. Yunus Cengel & Boles, "Thermodynamics – An Engineering Approach", TMH New Delhi, 2008.
3. Sachadeva R.C., "Fundamentals of Engineering Heat and Mass Transfer", New Age International (P) Ltd Publishers, New Delhi, 2010.
4. Dave S. Steinberg, "Cooling Techniques for Electronic Equipment", Second Edition, John Wiley & Sons, 1991.
5. Yunus Cengel & Afshin J Ghajar, "Heat and Mass Transfer: Fundamentals & its Applications", Mc Graw Hill, 5th Edition, 2013.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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|--------------------------|-----|-----------------------------------|------|
| 1. No. of Internal Tests | : 2 | Max. Marks for each Internal Test | : 30 |
| 2. No. of Assignments | : 2 | Max. Marks for each Assignment | : 5 |
| 3. No. of Quizzes | : 2 | Max. Marks for each Quiz Test | : 5 |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF MATHEMATICS

LINEAR ALGEBRA AND ITS APPLICATIONS (Open Elective)

SYLLABUS FOR B.E.III-SEMESTER

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U19OE310MA
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	On completion of the course, students will be able to
<ol style="list-style-type: none">Study the concept of Vector Spaces, Subspaces, Linear Span, Linear Dependence and Independence of vectors.Understand the meaning of Basis and Dimension of a vector Space and Co-ordinates.Understand the meaning of Linear transformation, properties.Understand Range and Kernel, Rank-Nullity and Matrix of Linear Transformation.Understand Inner Product Spaces, Orthonormal sets, Gram-Schmidt's Orthogonalization process.	<ol style="list-style-type: none">Solve the problems on Vector Spaces and Linear Dependence and Independence of vectors.Determine the Basis and Dimension of a Vector Space and find the Co-ordinates.Determine Linear Transformation, Range and Kernel and Matrix of Linear Transformation.Determine Range and Kernel, Rank-Nullity and Matrix of Linear Transformation.Determined distance, orthogonal, orthonormal sets and construct orthonormal basis based on Gram-Schmidt's Orthogonalization process.

UNIT – I (8 classes)

Vector Spaces-Definition of a Vector Space, Subspaces, Basis and Dimension, Coordinates and Change of Basis.

UNIT – II (6 classes)

Linear Transformation -I

Definition of Linear Transformation- Properties of Linear

Transformations – Product of Linear Transformations – Algebra of Linear Operators.

UNIT – III(6 classes)

Linear Transformation -II

Range and kernel of a linear map – Dimension of Range and Kernel - Rank and nullity – Inverse of linear transformation - Rank nullity theorem(without Proof)- Matrix of Linear Transformation.

UNIT – IV(8 classes)

Inner Product Spaces-The Dot Product on \mathbb{R} and Inner Product Spaces, Orthonormal Bases, Orthogonal Complements, Application: Least Squares Approximation.

Text Books:

1. Introduction to linear algebra with applications, Jim DeFranza, Daniel Gagliardi, Tata McGraw-Hill
2. An introduction to Linear Algebra, V.P Mainra, J.L Arora, Affiliated to East-West Press Pvt Ltd

Reference Books:

1. Elementary Linear algebra, Anton and Rorres, Wiley India Edition
2. Advanced Engineering Mathematics, Erwin Kreysing, Wiley Publication
3. Elementary Linear algebra, ron Larson, Cengage Learning

Online Resources:

1. <http://tutorial.math.lamar.edu/Classes/DE/DE.aspx>
2. <http://mathworld.wolfram.com/topics>
3. <http://www.nptel.ac.in/course.php>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1. No. of Internal Tests : Max. Marks for each Internal Test :
2. No. of Assignments : Max. Marks for each Assignment :
3. No. of Quizzes : Max. Marks for each Quiz Test :

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF CHEMISTRY

Battery science and Technology (Open Elective)

SYLLABUS FOR B.E.III-SEMESTER

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U20OE310CH
Credits: 2	CIE Marks: 40	Duration of SEE : 1.5 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are	On completion of the course, students will be able to
1. To introduce the various terms to understand the efficiency of batteries.	1. Discuss the construction, electrochemistry, technology and applications of selected primary batteries.
2. To know the relevant materials required for the construction of primary and secondary batteries.	2. Discuss the construction, electrochemistry, technology and applications of few secondary batteries.
3. To familiarize with the reactions involved during charging and discharging processes.	3. Explain the working principle, electrochemistry, technology and applications of prominent fuel cells.
4. To focus on the need of fuel cells and the concept of their construction and functioning.	4. Evaluate different batteries or fuel cells in order to select a suitable battery or fuel cell for a given application
5. To emphasize on the merits and demerits of each type of battery.	

UNIT-I: BATTERIES- FUNDAMENTALS

Introduction and types of batteries: Primary and secondary.

Battery characteristics: Free energy change, electromotive force of battery, ampere-hour, capacity, power, power density, energy density, efficiency, cycle life, tolerance to service conditions, performance characteristics.

UNIT-II: PRIMARY BATTERIES

Construction, chemistry and technology of Zinc-Air Battery, Zinc -HgO battery and their applications.

Primary lithium batteries: Soluble cathode cells, solid cathode cells- Lithium manganese dioxide, solid electrolyte cells- Lithium polymer electrolyte battery- Applications. Reserve battery- Electrochemistry of perchloric acid cell- applications.

UNIT-III: SECONDARY BATTERIES

Construction, chemistry and technology of maintenance free lead acid battery (MFLA), valve regulated lead acid battery (VRLA), absorbed glass mat lead acid battery (AGMLA) - comparison between lead acid battery and VRLA along with advantages - Construction, electro chemistry and applications of Nickel-Cadmium battery, Nickel metalhydride battery.

Lithium ion batteries: Construction, chemistry and applications of liquid organic electrolyte cells, polymer electrolyte cells, lithium ion cells.

UNIT- IV: FUEL CELLS

Introduction, classification based on temperature and nature of electrolyte. Working principle, components, applications and environmental aspects of alkaline fuel cell (AFC)- Hydrogen-Oxygen alkaline fuel cell, Molten carbonate fuel cell (MCFC), Polymer electrolyte membrane fuel cell (PEMFC), Solid oxide fuel cell (SOFC).

Books:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai and Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand and Co.Ltd., New Delhi (2006).
3. Dell R. M. and Rand D. A. J., "Understanding Batteries", Royal Society of Chemistry, UK, 2001.
4. Chemistry of Engineering Materials by R.P Mani and K.N.Mishra, CENGAGE learning
5. ShasiChawla, "Text Book of Engineering Chemistry", DhanpatRai Publishing Company, NewDelhi,2008.
6. BalasubramanianVishwanathan, "Energy sources", Elsevier Publications.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 2	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 2	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF CHEMISTRY

Corrosion science and its application (Open Elective)

SYLLABUS FOR B.E.III-SEMESTER

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U20OE320CH
Credits: 2	CIE Marks: 40	Duration of SEE : 1.5 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are	On completion of the course, students will be able to
1. To acquaint with the causes and factors influencing the rate of corrosion.	1.Explain different types of corrosion with suitable examples.
2. To understand the different types of corrosion like dry, wet and galvanic corrosion and their relative impact.	2.Discuss different factors that affect corrosion and passivation of metals.
3. To familiarize with few preventive methods of corrosion.	3.Select a suitable metallic coating, organic coating and inhibitors for corrosion control of the equipment in a given application.
4. To know various industrial methods like electroplating, electroless plating.	4.Discuss the principles and applications of cathodic protection and surface conversion coatings for corrosion control.
	5.Apply the knowledge of various methods of corrosion control to suggest a solution for corrosion control of a given equipment in a given industrial application.

UNIT-I: CHEMICAL AND ELECTROCHEMICAL CORROSION

Introduction - gravity, cause, chemical and electrochemical corrosion, Pilling – Bed worth rule, effect of nature of oxide layer on rate of chemical corrosion. Galvanic corrosion, electrochemical series and galvanic series. Formation of anodic and cathodic areas, Differential aeration corrosion -pitting, waterline corrosion, crevice corrosion, stress corrosion and corrosion fatigue. Passivation of metals, polarization curve of passivating metals, effect of pH and potential for iron(pourbaix diagram) and the polarization curve of iron.

Factors influencing corrosion

- a. Nature of metal: Relative position of metal in galvanic series, over voltage, relative areas of anode and cathode and nature of corrosion product.
- b. Nature of environment: Temperature, pH, humidity and dissolved oxygen.

UNIT-II: CORROSION CONTROL BY METALLIC COATINGS

Metallic coatings: Types - anodic and cathodic. Pre treatment of surface of base metal. Methods of application of metallic coatings: Hot dipping-galvanization - applications of galvanized RCC steel bars. Cladding, electroplating and electroless plating- Principle and their differences. Electroplating of Cu and Cr on Fe, electroless plating of Ni and Cu on insulators, Preparation of printed circuit board (PCB) by electrolessplating.

UNIT-III: CORROSION CONTROL BY ORGANIC COATINGS AND INHIBITORS

Organic Coatings: Paints – constituents and their functions. Vitreous enamel coatings. Varnishes. Super hydrophobic and self healing coatings. Epoxy coatings on RCC steel bars- impervious coatings.

Corrosion inhibitors: Anodic, cathodic and vapour phase inhibitors.

UNIT-IV: CORROSION CONTROL BY CATHODIC PROTECTION AND SURFACE MODIFICATION

Cathodic protection: Principle, sacrificial anodic protection (SAP), impressed current cathodic protection (ICCP). Application of cathodic protection for bridges, ship hulls and underground pipelines.

Surface conversion coatings: Carburizing, nitriding, cyaniding.

Books:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand and Co.Ltd., New Delhi (2006).
3. ShasiChawla, "Text Book of Engineering Chemistry", DhanpatRai Publishing Company, NewDelhi (2008).
4. Wiley Engineering chemistry, Wiley India pvt Ltd, II edition.
5. Chemistry in engineering and technology by J.C. Kuriacose and Rajaram.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1. No. of Internal Tests : Max. Marks for each Internal Test :

2. No. of Assignments : Max. Marks for each Assignment :

3. No. of Quizzes : Max. Marks for each Quiz Test :

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

Department of PHYSICS

Smart Materials & Applications (Open Elective)

SYLLABUS FOR B.E.III-SEMESTER

L:T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code: U20OE310PH
Credits: 2	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Students will be able to:	On completion of the course, students will be able to
<ol style="list-style-type: none"> 1. grasp the concepts of piezo and ferro electric materials 2. Learn fundamentals of pyro and thermo electric materials 3. gain knowledge on shape memory alloys 4. acquire fundamental knowledge on chromic materials 	<ol style="list-style-type: none"> 1. summarize various properties and applications of piezo and ferro electric materials 2. apply fundamental principles of pyro and thermo electricity in relevant fields of engineering 3. acquaint with various types of shape memory alloys and their properties and applications 4. appreciate the importance of chromic materials in engineering field.

UNIT I: PIEZO AND FERRO MATERIALS

Piezo electric effect and inverse piezoelectric effect, Piezo electric materials, Structure of Quartz crystal, Piezoelectric oscillator, Magnetostriction, Magnetostriction oscillator, piezo-electric sensors, applications of Piezo-electric materials.

Characteristics and properties of ferro-electric materials, Structure of Barium Titanate, Curie-Weiss law, applications of Ferro electric materials

UNIT II: PYRO AND THERMO-ELECTRIC MATERIALS

Pyroelectricity: pyro electric effect, pyro electric materials, pyro-electric sensors.

Thermoelectricity: thermoelectric effect, Seebeck effect, Peltier effect, thermoelectric sensor, Properties and applications of thermoelectric materials, thermoelectric generator and Thermoelectric cooler.

UNIT III : SHAPE MEMORY MATERIALS

Introduction to shape memory alloys (SMA)- Shape Memory Effect (SME) different phases of Shape memory alloys, Austenite, Martensite, Properties and characteristics of engineering SMAs, Super elasticity, one and two way shape memory effects, Properties of Ni-Ti shape memory alloy, Cu-based shape memory alloys, biomedical Materials, Advantages, disadvantages of SMAs, Applications of SMAs.

UNIT-IV: CHROMIC MATERIALS

Electro-chromaticity, Electro-chromic materials, Electro-chromic sensors and devices.

Photo-chromaticity, Photo-chromic materials, Photo-chromic sensors and devices.

Thermo-chromaticity, thermo-chromic materials, thermo-chromic sensors and devices.

Smart fluids: Magneto-rheological and Electro-rheological fluids.

Learning Resources:

1. K. Otsuka and C M Wayman, Shape memory materials, Cambridge university press, 1998.
2. TW Duerig, KN Melton, D Stockel, CM Wayman, Engineering aspects of shape memory alloys, Butterworth-Heinemann, 1990
3. A.K. Sawhney, A Course in Electronic Measurements and Instrumentation, Dhanpat Rai & Sons, 2015
4. D. Patranabis, Sensors and Transducers, PHI Learning Pvt. Ltd., 2013

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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|--------------------------|-----|-----------------------------------|------|
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| 3. No. of Quizzes | : 3 | Max. Marks for each Quiz Test | : 5 |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION (R-19)
B.E. – (CIVIL ENGINEERING) IV-SEMESTER ACADEMIC YEAR 2020 - 2021
(Students Admitted in 2019-2020)

B.E (Civil) IV Semester									
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination				
		Hours per Week			Duration in Hrs	Maximum Marks		Credits	
		L	T	P/D		SEE	CIE		
THEORY									
U19HS430EH	Skill Development-II : Communication Skills in English	2	-	-	3	60	40	2	
U19BS410MA	Numerical Methods, Probability and Statistics	3	-	-	3	60	40	3	
U19PC410CE	Strength of Materials – II	3	-	-	3	60	40	3	
U19PC420CE	Surveying-II	2	-	-	3	60	40	2	
U19PC430CE	Fluid Mechanics	3	-	-	3	60	40	3	
U19PC440CE	Building Technology	2	-	-	3	60	40	2	
U19OEXXXXX	Open Elective-II	3	-	-	3	60	40	3	
U19MC010CE	Environmental Science	2	-	-	3	60	40	-	
PRACTICALS									
U19PC411CE	Strength of Materials Lab	-	-	2	3	50	30	1	
U19PC421CE	Surveying-II Lab	-	-	2	3	50	30	1	
U19PC431CE	Fluid Mechanics Lab	-	-	2	3	50	30	1	
Student should acquire one online course certificate equivalent to two credits during III-VII Semester									
TOTAL		20	-	6		630	410	21	
GRAND TOTAL		26				1040			
Note: The left over hours are to be allotted to ECA-II / CCA-II / CC / RC / TC based on the requirement .									

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
SKILL DEVELOPMENT-II: COMMUNICATION SKILLS IN ENGLISH-II

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs/Week) :2 hours	SEE Marks :60	Course Code: U19HS430EH
Credits:2	CIE Marks :40	Duration of SEE: Hours :03

Course Overview:

Be it career or relationships, the harsh truth in today's global scene is that the future of any person is affected strongly by his//her communication skill in English. The four major skills of language learning, listening, speaking, reading and writing provide the right key to success.

Course Objective:

The main objective of this finishing school curriculum is to involve content for all the above mentioned four skills in teaching English and to get students proficient in both receptive and productive skills.

Overview of the delivery Methodology:

- Students will be given Reading/Listening exercises that they have would have to do as a prerequisite for the class room intervention
- Every Session will have activities on all the four skills. Listening, Speaking, Reading and Writing
- The Writing and Reading exercises will be given in the workbook and will carry marks
- Vocabulary exercises will also be part of every session
- Students will be asked to summarise their takeaways in every class in three sentences.
- The Lateral entry students will be given a self study plan for language enhancement and will be given extra reading and writing exercises. This will be done through Talent Sprint's online portal

- To personalize the learning a variety of case studies and structured problem solving activities will be given in small groups and the trainers will facilitate peer reviews.
- Integration of continuous grading (for assignment 1 and 2), instant feedback, (peer review sheets) clear goals, rewards (certificates and appreciation kits), have been included this time for positive reinforcement.

Unit 1: Discussions and Debates

Module Overview:

The module enables the students to build strategies for effective group interaction and help them in developing decisive awareness and personality maintaining emotional balance.

Learning Outcome:

The students should be able to:

- Participate in group and forum discussions by providing factual information, possible solutions, and examples.
- Debate on a topic by picking up the key points from the arguments placed.

Competencies:

- Analytical and Probing Skills
- Interpersonal Skills
- Comprehending key points of the debate and note decisive points including supporting details.
- Construct a logical chain of arguments and decisive points.

Sessions:

1. Six Thinking Hats
2. Biker B
3. Initiation Techniques
4. Generating points (VAP, SPELT, KWA)
5. Summarization Techniques

Unit 2: Powerful Presentations

Unit Overview:

Presentations need to be very straightforward and logical. This Module is designed to introduce students to an ideal structure for a presentation

Learning Outcome:

Students should be able to:

- Provide logical conclusions to the topics under discussion.
- Prepare, present, and analyze reports.
- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

Sessions:

1. Persuasion skills
2. Debating Structure and Content
3. Toulmin Model
4. Case Study Based Group Discussions

Unit 3 - Effective Technical Writing

Unit Overview:

Organizing writing in a logical order, using headings and easy-to-see bookmarks, and formatting table information are important for technical writing. This module is designed to give the trainees inputs on how to organize using Information Mapping. Editing plays an important role in Technical Writing. In this unit the trainees are also given inputs to correct spelling, language and Punctuation errors.

Learning Outcome:

The Students should be able to choose appropriate words and tone to present accurate, specific, and factual written documents

Competencies:

- Reporting an incident
- Writing/Presenting an essay
- Language and Vocabulary

Sessions:

1. Information Mapping
2. Report writing
3. Memos
4. SoP (statement of purpose)
5. MoM (Minutes of the Meeting)

Unit 4 - Reading for Content and Context

Unit Overview:

This course is designed to develop and improve reading and study skills needed for college work. Topics include identifying main idea and supporting details, determining author's purpose and tone, distinguishing between fact and opinion, identifying patterns of organization in a paragraph or passage and the transition words associated with each pattern, recognizing the relationships between sentences, identifying and using context clues to determine the meanings of words, identifying logical inferences and conclusions, and recognizing the point and support of an argument.

Learning Outcomes

Upon completion of the course, students should be able to:

1. Compose a summary of beginning high level reading text that identifies the thesis and key supporting details.
2. Summarize with 70% comprehension.
3. Apply reading skills, including how to approach different types of literature.

Competencies

- Distinguish facts from opinions.
- Make inferences
- Identify author's purpose, point of view, tone, and method of development.
- Comprehend the use of figurative language.

- Synthesize information gathered from reading in order to give informed opinion.

Sessions:

1. Skimming and Scanning Techniques
2. Recognition of author's purpose
3. Awareness of stylistic differences
4. Evaluation of fact and opinion
5. Discernment of fact and opinion

Unit 5 – Critical Reading Skills

Unit Overview:

Research shows that good reading skills can lead to well written assignments. In this unit, students will learn reading strategies to understand and retain information, to understand the organization of reading passages, and strategies for learning and retaining vocabulary. Building on these basic strategies, students will develop skills to critically analyze texts. In addition, students will practice and develop paraphrasing and summarizing skills. Students will receive ongoing feedback on their assignments throughout the course.

Learning Outcomes

- Recognition of propaganda techniques
- Present vocabulary building methods
- Use comprehension and vocabulary strategies to raise reading rate.

Competencies:

The student will enhance the ability to apply the following critical thinking skills when reading:

a. Understand the meaning of new vocabulary through:

- 1) Context clues, e.g., synonyms, antonyms, examples, definitions, and

restatements, etc.

2) Roots and affixes

b. Analyze text, e.g., simple outlining and note taking, summarize, draw conclusions, and apply information to personal experiences.

Sessions

1. Contextual Vocabulary
2. Theme Detection
3. Note making and Inference
4. Main idea identification
5. Précis Writing
6. Critical Response

Students are given workbooks prepared by Talent Sprint.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
	Duration of Internal Tests	:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

Numerical Methods, Probability and Statistics
(Civil, EEE & Mechanical only)

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : U19BS410MA
Credits :3	CIE Marks :40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 Study the methods to solve algebraic and transcendental equations, apply numerical methods to interpolate	1 Solve algebraic and transcendental equations using Bisection method Regula-Falsi, Newton-Rap son and apply numerical methods to interpolate.
2 Understand numerical differentiation and integrate functions and to solve differential equations using numerical methods.	2 Solve problems using numerical differentiation using interpolation approach and differential equations using numerical methods.
3 Understand Random variables Probability Distributions.	3 Apply various probability distributions to solve practical problems.
4 Understand tests of hypothesis for large and small samples.	4 Estimate unknown parameters of populations and apply the tests of hypotheses for large and small samples.
5 Study the method to fit different curves to a given data, how Correlation between variables can be measured.	5 Solve problems to fit various curves to the given data using curve fitting, and also to find co-efficient of correlation and to determine regression lines and their applications.

UNIT-I

Interpolation: Finite Differences- Interpolation- Newton's Forward and Backward Interpolation Formulae – Interpolation with unequal intervals – Lagrange's Interpolation Formula – Divided differences – Newton's Divided difference formula.

UNIT-II

Numerical Solutions of ODE: Numerical Differentiation -Interpolation approach- Numerical Solutions of Ordinary Differential Equations of first order - Taylor's Series Method - Euler's Method - Runge-Kutta Method of 4th order(without proofs)

UNIT-III

Probability: Random Variables - Discrete and Continuous Random variables- Properties- Distribution functions and densities - Expectation – Variance – Normal Distribution.

UNIT-IV

Test of Hypothesis: Introduction -Testing of Hypothesis- Null and Alternative Hypothesis -Errors- -Level of Significance – Confidence Intervals-Tests of Significance for small samples - t-test for single mean - F- test for comparison of variances - Chi-square test for goodness of fit – Introduction to Design of experiments.

UNIT-V

Curve Fitting: Curve fitting by the Method of Least Squares - Fitting of Straight line- Regression - Lines of Regression Correlation – Karl Pearson's Co-efficient of Correlation.

Learning Resources:

1. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
2. Higher Engineering Mathematics, Dr.B.S Grewal 40th Edition, Khanna Publishers.
3. Probability, Statistics and Random Processes, T. Veerarajan , Tata MCGraw Hill Education Private Ltd.
4. Advanced Engineering Mathematics, Kreyszig E, 8 th Edition, John Wiley & Sons Ltd, 2006.
5. A text book of Engineering Mathematics by N.P.Bali & Manish Goyal, Laxmi Publication.

6. Fundamentals of Mathematical Statistics, Gupta & Kapoor, Sultan chand & sons, New Delhi.
7. <http://tutorial.math.lamar.edu/Classes/DE/DE.aspx>
8. <http://mathworld.wolfram.com/topics>
9. <http://www.nptel.ac.in/course.php>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
STRENGTH OF MATERIALS – II

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: U19PC410CE
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will be able to	Upon the completion of this course students will be able to
<ol style="list-style-type: none">1. Examine and interpret the deflection of simply supported, cantilever and overhanging beams2. Analyze propped cantilevers, fixed and continuous beams for deflection, shear and bending moment3. Locate shear centre and draw shear flow in simple sections.4. Analyze torsion of circular shafts and analyse helical and bending springs and examine the concept of strain energy5. Investigate the behaviour of columns and struts.	<ol style="list-style-type: none">1. Express understanding of methods of double integration, conjugate beam and Mohr's theorems to solve problems of deflection of beams and construct shear force and bending moment diagrams2. Determine shear centre for simple sections.3. Compute the torsional shear stress across the cross section of circular shafts.4. Compute stresses in helical springs and compute strain energy in bars subjected to axial and flexural deformation5. Compute the axial and bending stresses in columns using various formulae

UNIT-I:Deflections: Slope and deflection by the double integration method for cantilever and simply supported beams, and beams with overhangs carrying point loads, uniformly distributed and varying load over entire span. Moment area and conjugate beam methods for single beams having different moment of inertia

UNIT-II: Propped Cantilevers: Cantilever beams on elastic and rigid props for point loads and uniformly distributed loads. Bending moment and shear force diagrams, and deflections.

Fixed Beams: Determination of shear force, bending moment, slope and deflection in fixed beams with and without sinking of supports for point loads, uniformly distributed loads, and uniformly varying load over entire span. SFD, BMD - Elastic curve.

UNIT-III: Continuous Beams: Determination of moments in continuous beams with and without sinking of supports by the theorem of three-moments; bending moment and shear force diagrams. Elastic curve.

Shear Centre: Concept and importance of shear centre shear flow and determination of shear centre of simple sections such as T sections and Channel sections with one axis of symmetry.

UNIT-IV: Torsion: Theory of torsion in solid and hollow circular shafts; shear stress, angle of twist, strength and stiffness of shafts. Transmission of power. Combined torsion and bending with and without end thrust. Determination of principal stresses and maximum shear stress. Equivalent Bending Moment and Twisting Moment.

Springs: Close and open coiled helical springs under axial load and axial twist.

UNIT-V: Strain Energy: Strain energy of resilience in determinate bars subjected to gradually applied loads and impact loads. Resilience of beams. Castigliano's theorem and its applications to beams. Theorem of reciprocal deflections.

Columns and struts: Euler's theory. Rankine – Gordon's formula, straight-line formula, effect of end conditions, slenderness ratio, eccentrically loaded columns, and Secant and Perry's formulae.

Learning Resources:

1. Ramamrutham S., Narayanan R., "Strength of Materials", Dhanpat Rai Publishing Company, New Delhi, 2011.
2. Bansal R.K., A text book of "Strength of Materials", Laxmi Publications, New Delhi, 2010.
3. Rajput R.K., "Strength of Materials" S.Chand Publications, New Delhi, 2006.
4. Junnarkar S.B., "Mechanics of Structures" (Vol-I & II), Charotar Publishing House, Anand, 2002.
5. Pytel and Singer F.L., "Strength of Materials", Harper & Row, New York, 1999.

6. Subramanian R., "Strength of Materials", Oxford University Press, 2010.
7. Ferdinand P. Beer, E. Russell Johnston Jr, John T. Dewolf, David F. Mazurek, "Mechanics of Materials", 2016.
8. NPTEL Course (www.nptel.ac.in)

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
SURVEYING-II

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week): 2 : 0 : 0	SEE Marks:60	Course Code: U19PC420CE
Credits : 2	CIE Marks:40	Duration of SEE: 3 Hrs

In this subject the students will	Upon the completion of this course students will be able to
<ol style="list-style-type: none">1. Understand basic surveying operations and computations using theodolite for various applications in field such as determination of elevations and setting of various curves2. Study the modern techniques in surveying with GPS, aerial photogrammetry, remote sensing, GIS.	<ol style="list-style-type: none">1. Determine the elevations and horizontal distances of any point on the surface of the earth using concepts of trigonometric leveling and geodetic observations.2. Compute the parameters required for setting out simple circular curve, reverse curve, compound curves and introduce the concepts of transition curves and vertical curves required for layout of roads and railways.3. Compute area of regular / irregular land from field measurements and volume of the earthwork from cross sections, spot levels and contours.4. Apply the concepts of modern tools such as GPS and aerial photogrammetry for measurement of details on surface of earth and relate to civil engineering problems5. Understand the concepts of Remote sensing, GIS and outline the techniques for measurement of sounding in water by various hydrographic surveying techniques

UNIT-I: Trigonometric leveling and Geodetic observations:

Trigonometrical levelling, calculation of elevations and distances of accessible and inaccessible objects, Problems. Geodetic observations, Refraction and curvature corrections, axis signal correction, determination of difference in

elevation by single and reciprocal observations, problems.

UNIT-II: Curves: Theory of simple curves. Setting out simple curves by linear and angular methods. Compound curves – Elements – Solution to different cases. Reverse curves – Parallel straights and Non parallel straights. Introduction to transition curves and vertical curves.

UNIT-III: Computation of areas: Simpsons rule, Trapezoidal rule, Meridian distance method, Double meridian distance method, Double parallel distance method, Departure and total latitude method, coordinates method, Introduction to planimeter.

Computation of volumes: Computation of area of cross section for level section, two level section, side hill two level section, three level section and multi level section. Volume of earthwork by trapezoidal and prismatic method. Volume from spot levels and contour plans

UNIT-IV: Global Positioning System (GPS): Overview of GPS, Functional system of GPS – Space segment, control segment and user segment, working principle of GPS/DGPS, Errors in GPS

Introduction to photogrammetry: Basic definitions, scale of vertical photograph, Displacements and errors in aerial photogrammetry, Introduction to UAV systems, classification and applications

UNIT-V:Remote Sensing: Definition, Elements of remote sensing, Electromagnetic spectrum and radiation, concept of spectral reflectance, Types of remote sensing, Remote sensing satellites, sensor resolutions, and applications to Civil Engineering.

Geographic Information Systems (GIS): Definition, components of GIS, Functions and advantages of GIS, applications to Civil Engineering

Hydrographic Survey: Brief introduction, Equipment used in hydrographic survey, methods and applications.

Learning Resources:

1. Punmia B.C., Ashok Kumar Jain, Arun Kumar Jain, Surveying, Vol. 1 and 2, Laxmi Publications, 2016.
2. Duggal S.K., Surveying-II, Mc Graw Hill, 2013.
3. Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011.
6. Subramanian R., Surveying and Levelling, Oxford University Press, 2014.
7. Venkatramaiah C., A Text Book of Surveying, Universities Press, Hyderabad, 2011.
8. David Clark, Plane and Geodetic Surveying for Engineers, Higher Surveying Vol. 2, CBS Publishers and Distributors Pvt Ltd, 2004.
9. Arora K.R., Surveying, Vol.1 and 2, Standard Publishers Distributors, 2013.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
FLUID MECHANICS

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: U19PC430CE
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will	Upon the completion of this course students will be able to
<ol style="list-style-type: none">1. Learn the properties of fluids2. Apply the laws of conservation of mass, energy and momentum for fluid flow.3. Assess the phenomenon of flow in pipes and study concepts of dimensional analysis and model studies.	<ol style="list-style-type: none">1. Compute properties of fluid and discuss about fluid statics2. Understand various aspects of Fluid kinematics3. Formulate equations based on conservation of mass, energy and momentum. Analyse forces on nozzles and describe devices use for discharge.4. Compute Reynolds number, formulate equations for laminar and turbulent flow through pipes and water hammer in pipes.5. Discuss and solve problems on compressible flow and dimensional analysis and model studies.

UNIT-I: Fluid Properties: Definition of fluid, properties of fluids, density, specific weight, specific volume, specific gravity, bulk modulus, vapour pressure, viscosity. Newton's law of viscosity and its applications. Capillarity and surface tension.

Measurement of Pressure: Piezometer and U tube Manometers. Bourdon Gauge. Absolute pressure and Gauge pressure.

Hydro Statics: Pascal law, buoyancy, metacentre and metacentric Height, Total pressure and centre of pressure on Horizontal plane and vertical plane surfaces.

UNIT-II: Fluid Kinematics: Classification of fluid flow; steady, unsteady,

uniform, non-uniform, one, two and three-dimensional flows, Rotational and irrotational flows. Concepts of streamline, stream tube, path line and streak line. Law of mass conservation. Continuity equation from control volume and system analysis. Stream function and velocity potential function. Convective and local acceleration, flow net and its uses.

UNIT – III: Fluid Dynamics: Body forces and surface forces. Euler's equation of motion in three dimensions.

Law of Energy Conservation: Bernoulli's equation from integration of Euler's equation. Significance of the Bernoulli's equation, limitations, modifications and application to real fluid flows, venture meter and orifice meter.

Impulse Momentum Equation: Application of the impulse momentum equation to evaluate forces on nozzles and bends. Vortex flow; forced and free vortex.

Measure of Discharge in Free Surface Flows: Notches and weirs.

UNIT-IV :Flow through Pressure Conduits: Reynold's experiment and its significance. Upper and lower critical Reynold's Numbers. Critical velocity, Hydraulic gradient and Energy gradient line. Laminar flow through circular pipes. Hagen - Poiseuille equation. Characteristics of turbulent flow. Head loss in pipes. Darcy - Weisbach equation. Friction factor. Moody's diagram. Minor losses. Pipes in series and pipes in parallel. Unsteady flow in pipes: Water hammer phenomenon, pressure rise due to gradual and sudden valve closure.

UNIT-V :Dimensional Analysis and Model Studies: Dimensional analysis as a tool in experimental hydraulics, Buckingham's pi-theorem, applications, geometric, Kinematics and dynamic similarity, similarity laws; significance of Reynold's, Froude and Mach Numbers, different types of models and their scale ratios.

Learning Resources:

1. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics including Hydraulics Machines, Standard Book House, Delhi, 2015.
2. Bansal R.K., Fluid Mechanics and Hydraulic Machines, Laxmi Publications,

2010.

3. Ojha C.S.P., Berndtsson R., Chandramouli P.N., Fluid Mechanics and Machinery, Oxford University Press, 2012.
4. Rajput R.K., Fluid Mechanics and Hydraulic Machines, S. Chand & Co., 2013.
5. K Srinivasa Raju and D Nagesh kumar, " Fluid Mevhanics problem solving using MATLAB" Prentice Hall of India, 2020
6. NPTEL Course (www.nptel.ac.in)

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
BUILDING TECHNOLOGY

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):2 : 0 : 0	SEE Marks:60	Course Code: U19PC440CE
Credits : 2	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	At the end of the course, students will be able to:
<ol style="list-style-type: none">1. Expose students to the concepts of building planning and various aspects of green buildings.2. Acquire basic knowledge on conventional building materials and emerging building materials3. Study construction practices like scaffolding and form work, Stair cases.	<ol style="list-style-type: none">1. Apply the principles of planning and bylaws for planning of building2. Explain the characteristics of stones, bricks, timber and steel3. Describe the properties of cement, aggregate, concrete, mortar.4. Illustrate the application of emerging building materials and paints, varnishes and water proofing materials in buildings.5. Review construction practices like scaffolding, form work brick bands and types & terminology of stair cases.

UNIT-I:Building Planning : Basic building elements, site selection for buildings, Principles of planning. Relevant Municipal building bylaws National Building Code (NBC) &, orientation of buildings. Provision for physically handicapped facilities.

UNIT-II: Stones: Uses of stones as building materials, characteristics of good building stones.

Bricks: Composition of brick clay, Characteristics of good building bricks, IS classification of bricks.

Timber: Timber as a building material and its uses. Various types of timber. Seasoning and its importance. Preservation of wood. Plywood & Laminates and

their uses.

Reinforcing steel: Composition, types and specifications of reinforcing steel

UNIT-III: Cement: Chemical composition of cement, manufacturing process. Specifications for Ordinary Portland Cement, Types of cement.

Fine Aggregate: Characteristics of sand and its classifications, bulking of sand. Quarry sand.

Coarse Aggregate: Characteristics of coarse aggregates for preparation of concrete.

Cement Mortar: Proportions of Cement Mortar and uses.

Concrete: Designation, workability of concrete – factors affecting, Slump test, compacting factor test.

UNIT-IV: Emerging Building Materials: Eco friendly and Sustainable building materials-Fly ash, GGBS, Bamboo. Recycled materials- Aggregates, Plastic

Miscellaneous Materials: Paints, Varnishes and Distempers-Water proofing materials, Light Weight building blocks.

UNIT- V: Construction practices: Scaffolding and Form work, English and Flemish Brick Bonds, – Types and purposes. Plumbing services, Fire protection.

Stair Cases: Terminology, Types of stair cases – dog legged, open well, bifurcated and spiral stair case.

Green Building: Concept of Green building, Principles of green buildings, Provision of rainwater harvesting, Certification systems – Green Rating for Integrated Habitat Assessment (GRIHA) and Leadership in Energy and Environmental Design (LEED).

Learning Resources:

1. Kumara Swamy N., Kameswara Rao A., Building Planning And Drawing, Charotar, Publications, 2013.
2. Arora S.P. and Bindra S.P., A Text Book of Building Construction, Dhanpat Rai & Sons Publications, 2013.

3. Sushil Kumar, Building Construction, Standard Publishers, 2006.
4. Varghese P.C., Building Materials, PHI Learning Pvt. Ltd., Delhi, 2015.
5. National Building Code of India, 2005.
6. Advances in Building Materials and Construction, Central Building Research Institute, Roorkee, 2004.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
ENVIRONMENTAL SCIENCE

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week): 2 : 0 : 0	SEE Marks:60	Course Code: U19MC010CE
Credits : - - -	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>In this subject the students will</i>	<i>Upon the completion of this course students will be able to</i>
<ol style="list-style-type: none">1. Describe various types of natural resources available on the earth surface.2. Explain the concepts of an ecosystem and the biotic and abiotic components of various aquatic ecosystems.3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity.4. Explain the causes, effects and control measures of various types of environmental pollutions.5. Describe the methods for water conservation, the causes, effects of global warming, climate change, acid rain, ozone layer depletion, population explosion.	<ol style="list-style-type: none">1. Describe the various types of natural resources.2. Differentiate between various biotic and abiotic components of ecosystem.3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India.4. Illustrate causes, effects, control measures of various types of environmental pollutions.5. Explain the methods of water conservation, causes, effects of climate change, global warming, acid rain and ozone layer depletion, population explosion.

UNIT-I: Environmental Studies: Definition, importance of environmental studies. Natural resources: Water resources; floods, drought, conflicts over water, dams-benefits and problems. Food resources; Effects of modern agriculture, fertilizer-pesticide problems, water logging salinity. Energy resources: Renewable and non-renewable energy resources. Land Resources, soil erosion and desertification.

UNIT-II: Ecosystems: Structure and function of an ecosystem, producers, consumers and decomposers, food chains, food webs, ecological pyramids, aquatic ecosystems (ponds, oceans, estuaries).

UNIT-III: Biodiversity: Genetic, species and ecosystem diversity. Values of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV: Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste & e-waste management.

UNIT-V: Social Aspects and the Environment: Water conservation, Climate change, global warming, acid rain, ozone layer depletion. Environmental Impact Assesment, population explosion.

Learning Resources:

1. Deswal S. and Deswal A., A Basic Course on Environmental studies, Dhanpat Rai & Co Pvt. Ltd. 2013.
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2006.
3. Suresh K. Dhameja, Environmental Studies, S.K. Kataria & Sons, 2010.
4. De A.K., Environmental Chemistry, New Age International, 2003.
5. Odum E.P., Fundamentals of Ecology, W.B. Sunders Co., USA, 2004.
6. Sharma V.K., Disaster Management, National Centre for Disaster Management, IIPE, Delhi, 2013.
7. Rajagopalan R., Environmental Studies, Second Edition, Oxford University Press, 2013.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
STRENGTH OF MATERIALS LAB

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week): 0 : 0 : 2	SEE Marks:50	Course Code: U19PC411CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>Objectives of this course are to:</i>	<i>Upon the completion of this course students will be able to</i>
1. Determine the properties of materials under the action of various loads.	1. Determine Young's Modulus of materials of beams by conducting deflection tests. 2. Assess the properties of materials by conducting hardness test, impact test, tension test and compression test. 3. Determine modulus of rigidity of materials by conducting torsion test and tests on springs. 4. Practise working as a team member and lead a team 5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively

List of Experiments

1. Determination of Young's modulus by conducting deflection test on Cantilever beam
2. Determination of Young's modulus by conducting deflection test on Simply supported beam
3. Izod Impact test
4. Direct tension test on metal rods
5. Brinnell and Rockwell Hardness test
6. Compression test on brittle and ductile materials
7. Determination of modulus of rigidity by conducting tension test on a helical spring
8. Determination of modulus of rigidity by conducting compression test
9. Determination of modulus of rigidity by conducting torsion test
10. Determination of modulus of elasticity by conducting deflection test on fixed beam

11. Determination of modulus of elasticity by conducting deflection test on continuous beam
12. Bend test on metal rod

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test:	2 Hours		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
SURVEYING-II LAB

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week): 0 : 0 : 2	SEE Marks:50	Course Code: U19PC421CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>Objectives of this course are to:</i>	<i>Upon the completion of this course students will be able to</i>
1. Apply classroom knowledge in laboratory exercises and handling of Theodolite, GPS and Total station.	1. Determine the RL of a given point in different practical situations 2. Apply the principles of tacheometry in the field 3. Demonstrate usage of Total Station and GPS in field projects. 4. Practice working as a team member and make effective presentations. 5. Demonstrate professional behaviour in conducting the experiments and present the results effectively

LIST OF EXPERIMENTS

1. Determine the RL of the given point using two instrument stations by single plane and double plane method.
2. Determine the gradient of a line connecting two points using tangential and stadia tacheometry
3. Indirect contour surveying using Tacheometry
4. Plotting simple curve by Rankine's method using theodolite
5. Measurement of horizontal and vertical distances using total station
6. Plotting of a simple curve using total station
7. Plotting of topographical features of the given area using total station

8. Develop the contour map for a given area using total station
9. Traversing by using total station
10. Location of points, lines and polygon features by using GPS survey.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test:	2 Hours		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
FLUID MECHANICS LAB

SYLLABUS FOR B.E. IV-SEMESTER

L : T : P (Hrs./week):0 : 0 : 2	SEE Marks:50	Course Code: U19PC431CE
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will	Upon the completion of this course students will be able to
<ol style="list-style-type: none">1. Provide practical knowledge in verification of principles of fluid flow2. Impart knowledge in measuring coefficient of discharge for various devices.	<ol style="list-style-type: none">1. Determine coefficient of discharge for various measuring devices such as orifice, venturimeter, mouth piece, notches, weirs and hemispherical vessel and Validate Bernoulli's theorem..2. Calculate Reynolds number and classify types of flows.3. Estimate Darcy's friction factor for turbulent flow in pipes.4. Practise working as a team member and lead a team5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively

List of Experiments

1. Determination of C_d , C_v and C_c for Circular Orifice
2. Determination of C_d for Mouthpiece
3. Determination of C_d for V-notch
4. Determination of C_d for Rectangular notch
5. Determination of C_d for Venturimeter
6. Determination of C_d for Hemi-spherical vessel
7. Determination of types of flows using Reynolds Apparatus
8. Determination of Darcy's coefficient of friction.

9. Verification of Bernoulli's Theorem.
10. Determination of C_d for Orifice Meter
11. Determination of coefficient of sudden contraction (minor losses)

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test:	2 Hours		

**OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN
B.E. IV SEMESTER (2020-21)**

Dept	Title	Code	credits
CSE	Introduction To Data Structures	U190E410CS	3
CSE	Introduction To Software Engineering	U190E420CS	3
ECE	Mathematical Programming for Engineers	U190E410EC	3
ECE	Introduction to Communication Systems	U190E420EC	3
IT	Introduction to Object Oriented Programming	U190E410IT	3
IT	Introduction to Scripting Languages	U190E420IT	3
Mech.	Optimization Methods	U190E410ME	3
HSS	Critical Thinking	U190E410EH	3

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

Department of Computer Science & Engineering

INTRODUCTION TO DATA STRUCTURES (OPEN ELECTIVE-II)

SYLLABUS FOR B.E. IV-SEMESTER
(COMMON FOR CIVIL, ECE, EEE & MECH)

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U190E410CS
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Identify and use appropriate data structure for a given problem. 2. Describe the linear and nonlinear data structures.	On completion of the course, students will be able to 1. Implement linear data structures 2. Develop an application using stacks and queues. 3. Choose the appropriate nonlinear data structure and perform various operations on trees. 4. Perform various operations on graphs. 5. Analyze the time and space complexities of Algorithms.

UNIT – I:

Arrays: Arrays - ADT, Polynomials, Sparse matrices,

Linked Lists: Singly Linked Lists, Circularly linked lists, Doubly Linked Lists.

UNIT – II :

Stacks: Array Representation, Linked Representation, Applications.

Queues: Array Representation, Linked Representation, Applications.

UNIT – III: Introduction to non linear Data Structures: Tree Definitions and Properties, Representations of Binary Trees, Operations, Binary Tree Traversal

UNIT-IV: Graphs: Graph Definitions, properties and representations, Elementary Graph operations, Minimum Cost Spanning Trees- Kruskal's Algorithm, Prim's Algorithm.

UNIT-V: Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations

Learning Resources:

1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition(2008), Universities Press
2. Mark A Weiss, Data Structures and Algorithm Analysis In C, Second Edition(2002), Pearson
3. Kushwaha D. S and Misra A.K, Data structures A Programming Approach with C, Second Edition(2014), PHI.,
4. Gilberg R. F and Forouzan B. A, Data structures: A Pseudocode Approach with C, Second Edition(2007), Cengage Learning
5. Tanenbaum A. M , Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson.
6. Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, Third Edition(2009), MIT Press
7. Yedidyah Langsam , Moshe J. Augenstein ,Aaron M. Tenenbaum, Data Structures Using C and C++ , Second Edition(2009), PHI
8. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos>
9. <http://nptel.ac.in/courses/106106127/>
10. <http://www.nptel.ac.in/courses/106102064>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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|--------------------------|---|--------------------------------|-----------------------------------|---|---------------------------------|
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| 3. No. of Quizzes | : | <input type="text" value="3"/> | Max. Marks for each Quiz Test | : | <input type="text" value="5"/> |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

Department of Computer Science & Engineering

INTRODUCTION TO SOFTWARE ENGINEERING (OPEN ELECTIVE-II)

**SYLLABUS FOR B.E. IV-SEMESTER
(COMMON FOR CIVIL, ECE, EEE & MECH)**

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U190E420CS
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. understand the concepts involved in the lifecycle of software development 2. learn the best practices to be employed for the design, and testing of a software project.	On completion of the course, students will be able to 1. Explain the software development lifecycle models for software system development. 2. Learn the requirement process steps in software process model. 3. Analyze the structural design models in object oriented system. 4. Analyze the behavioral design models used in object oriented system. 5. Identify verification and validation methods in a software engineering project at various phases of SDLC.

UNIT-I:

Introduction to Software Engineering:

A generic view of Process: Software Engineering, Process Framework, CMMI, Process Patterns, Process Assessment.

Process Models: Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process.

An Agile view of Process: What is an Agile Process, Agile Process Models-SCRUM, XP.

UNIT-II: Requirements Engineering: A bridge to Design and Construction, Requirements Engineering Tasks, Initiating Requirements Engineering Process, Eliciting Requirements, Negotiating Requirements, Validating Requirements.

UNIT-III:

Object oriented Modeling & design using UML: Introduction to UML.

Structural Modeling: Classes and Advanced Classes, Relationships ,Common Mechanisms, Class Diagrams, Interfaces, Types and Roles.

UNIT-IV:

Behavioural Modelling: Interactions, Interaction diagrams, Use Cases, Use Case Diagrams, Activity diagrams, State Machines, State chart Diagrams.

Architectural Modelling: Artifacts, Artifact diagrams, Deployment diagrams.

UNIT-V:

Testing Strategies: A Strategic approach to software testing ,Strategic issues, Test strategies for Conventional software, O-O Software, Validation testing, System testing, the art of debugging.

Testing Tactics: Software testing fundamentals, Black box and White box testing, Basis path testing, Control Structure, O-O testing methods, Testing for specialized environments, architectures and Applications testing patterns.

Learning Resources:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 6th Edition (2005), Tata McGrawHill.
2. Grady Booch, James Rumbaugh, Ivor Jacobson, The Unified Modeling Language-User guide, (Covering UML 2.0) ,2nd Edition Pearson Education, India 2007.
3. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edition (2005), Narosa Publishing House.
4. <http://nptel.ac.in/courses/106101061/>
5. <http://istqbexamcertification.com/what-is-a-software-testing/>
6. <http://agile.csc.ncsu.edu/SEMaterials/UMLOverview.pdf>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mathematical Programming for Engineers (OPEN ELECTIVE - II)

SYLLABUS FOR B.E.IV-SEMESTER

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U19OE410EC
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To provide fundamental knowledge of programming language for solving problems.	On completion of the course, students will be able to <ol style="list-style-type: none">1. Generate arrays and matrices for numerical problems solving.2. Represent data and solution in graphical display.3. Write scripts and functions to easily execute series of tasks in problem solving.4. Use arrays, matrices and functions in Engineering applications5. Design GUI for basic mathematical applications.

UNIT - I : Introduction:

Basics of MATLAB, MATLAB windows, Advantages of MATLAB, on-line help, file types.

MATLAB Basics: Variables and Constants – Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple plots, Creating , Saving and Executing a Script File, Creating and Executing a function file.

Programming Basics: Data types-Operators – Hierarchy of operations, Relational and logical operators, if-end structure, if-else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands

UNIT - II : Scripts and Functions

Script Files, Function Files, Debugging methods in MATLAB.

Graphics: Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots-subplots-specialized 2D plots: stem-,bar, hist, pi, stairs, loglog, semilog, polar, comet 3D plots: Mesh,Contour,Surf,Stem3,ezplot.

UNIT - III : Numerical Methods Using MATLAB

Numerical Differentiation, Numerical integration- Newton-Cotes integration formulae, Multi-step application of Trapezoidal rule, Simpson's 1/3 Rule for Numerical Integration. MATLAB functions for integration.

Linear Equations- Linear algebra in MATLAB, Solving a linear system, Gauss Elimination, Finding eigen values and eigen vectors, Matrix factorizations, Advanced topics.

UNIT - IV : Nonlinear Equations

System of Non-linear equations, Solving System of Equations Using MATLAB function fsolve, Interpolation-Lagrange Interpolation, Two dimensional Interpolation, Straight line fit using Least Square Method, Curve fitting using built-in functions ployval and polyfit, cubic fit using least square method. Finding roots of a polynomial -roots function, Newton-Raphson Method

UNIT - V :

Solution of Ordinary differential Equations(ODEs)-The 4th order Runge-kutta Method, ODE Solvers in MATLAB,Solving First –order equations using ODE23 and ODE45.

Structures and Graphical user interface(GUI):Advanced data Objects, How a GUI works, Creating and displaying a GUI. GUI components, Dialog Boxes.

Learning Resources:

1. Getting started with MATLAB "A quick introduction for scientist and engineers by RudraPratap, Oxford publications.
2. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam,S.Islam,S.K.Patel-I.K.International Publishing House Pvt.Ltd.
3. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th Edition- Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Math works.
4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siau Alexandre Bayen, Elsevier-18th April 2014.
5. <https://nptel.ac.in/courses/103106118/2>
6. <https://www.udemy.com/numerical-methods/>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Communication Systems (OPEN ELECTIVE - II)

SYLLABUS FOR B.E.IV-SEMESTER

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U19OE420EC
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
<ol style="list-style-type: none">1. Distinguish between Amplitude and Frequency modulation methods and their application in Communication Receivers2. Explain why multiplexing methods are necessary in communications and compare FDM with TDM3. Compare and contrast FSK and BPSK modulation schemes employed in digital data transmission4. Draw the block diagrams of different types of communication systems and explain their operation	<p>On completion of the course, students will be able to</p> <ol style="list-style-type: none">1. Identify the Radio frequency spectrum and the bands of different types of radio systems2. Analyze the power, efficiency and transmission bandwidth of Amplitude and Frequency Modulated signals.3. Convert the Radio frequency to Intermediate frequency and explain the operation of Super heterodyne Receiver.4. Compare and contrast Frequency Division Multiplexing and Time Division Multiplexing used in the Communication systems5. Detect and correct errors present in bit stream data using parity check6. Explain the basic principles of different types of communication systems.

UNIT - I :

Introduction to Electronic Communication: Communication systems, Types of Electronic Communication, Modulation and Multiplexing, The Electromagnetic Spectrum, Bandwidth, Communication Applications, Gain and Attenuation definitions

Amplitude Modulation Fundamentals: AM concepts, Modulation Index and Percentage of Modulation, Sidebands and the Frequency Domain, AM Power

UNIT - II :

Fundamentals of Frequency Modulation: Basic principles of Frequency Modulation, Principles of Phase Modulation, Modulation Index and Sidebands, Noise – Suppression Effects of FM, Frequency Modulation versus Amplitude Modulation.

Communication Receivers: Basic Principles of Signal Reproduction, Superheterodyne Receivers, Frequency Conversion, Intermediate Frequency and Images, Noise.

UNIT - III :

Digital Communication Techniques: Digital Transmission of Data, Parallel and Serial Transmission, Data Conversion, Pulse Modulation.

Multiplexing and De-multiplexing: Multiplexing Principles, Frequency Division Multiplexing, Time Division Multiplexing, PCM Multiplexing.

UNIT - IV :

Transmission of Binary Data in Communication Systems: Digital Codes, Principles of Digital Transmission, Transmission Efficiency, Modem Concepts and Methods – FSK, BPSK, Error Detection and Correction

UNIT - V :

Different Types of Communication Systems: Microwave Concepts, Optical Principles, Optical Communication System, Satellite Communication Systems, Satellite Orbits, Cellular Telephone Systems, Bluetooth and Wi-Fi basics

Learning Resources:

1. Louis E. Frenzel, Principles of Electronic Communication Systems, 3rd Edition. Tata McGraw Hill.
2. Wayne Tomasi, Electronic Communications Systems, 5th Edition, Pearson Education.
3. <https://nptel.ac.in/syllabus/syllabus.php?subjectId=117102059>
4. <https://nptel.ac.in/courses/117101051/12>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO OBJECT ORIENTED PROGRAMMING

(Open Elective-II) (Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E.IV-SEMESTER

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U19OE410IT
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	On completion of the course, students will be able to
Explain the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, building simple GUI applications.	<ol style="list-style-type: none">1. Understand fundamental concepts in Object oriented approach.2. Develop object-oriented programs using the concepts of exception handling and multi threading.3. Demonstrate the usage of Java I/O streams to handle user input and output.4. Design and develop GUI programs.5. Develop Applets for web applications.

UNIT- I

Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables-scope and lifetime, Operators, Control statements, Structure of a Java class, Classes, Methods, Inheritance, and Command Line Arguments.

Arrays: One-dimensional arrays, creating an array, declaration of arrays, initialization of arrays, two-dimensional arrays.

Packages: Creation, importing a package and user defined package.

Interfaces: Defining interfaces, extending interfaces, implementing interfaces.

UNIT- II

Exception Handling: Introduction, types of exceptions, syntax of exception handling code, multiple catch statements, using finally statement, user-defined exceptions.

UNIT- III

Basic I/O Streams: Java I/O classes and interfaces, Files, Stream and Byte classes, Character Streams, Serialization.

Exploring java.lang: Object, Wrapper classes, String, StringBuffer, System

UNIT- IV

Introducing AWT working with Graphics: AWT Classes, Working with Graphics. Event Handling: The Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces.

Awt Controls: Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, CheckboxGroup, Choice Controls, Using Lists, Managing Scroll Bars, Using TextField, Using TextArea, Understanding Layout Managers, Menu bars and Menus, Dialog Boxes, FileDialog, Exploring the controls, Menus ,and Layout Managers.

UNIT- V

Applet Programming: Introduction, how applets differ from applications, building applet code, applet life cycle, HTML-APPLET tag, passing parameters to applets.

Learning Resources:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill, 2006.
2. James M Slack, Programming and Problem solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th edition, McGraw Hill Publishing, 2010.

4. Y. Daniel Liang , An Introduction to JAVA Programming, Tata McGraw Hill, 2009.
5. Kathy Sierra, Head First Java, 2/e, Shroff Publishers, 2012.
6. <https://docs.oracle.com/javase/tutorial/>
7. <https://nptel.ac.in/courses/106105191/>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO SCRIPTING LANGUAGES

(Open Elective-II) (Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E.IV-SEMESTER

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U19OE420IT
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
On completion of the course, students will be able to	
This course will enable the students to acquire basic skills for writing python scripts.	<ol style="list-style-type: none">1. Write a python script to solve a basic problem using structured programming constructs2. Write a python script to solve a basic problem using object oriented programming constructs3. Create and use python modules4. Handle file related operations5. Encode and decode strings

Unit – I

Introduction to Python, running a python script, writing comments, using variables, operators, strings and text, format specifiers , printing information. passing command line arguments, prompting users, parameters, unpacking variables.

Unit – II

Decision making : if and else if, repetition : while loops and for loops, lists, operations on list , tuples, operations on tuples, sets, operations on sets, dictionaries, operations on dictionaries.

Unit – III

Defining functions, passing arguments to functions , returning values from functions, Exception handling.

Unit – IV

Modules , Classes and Objects, is – a relationship : inheritance, has-a relationship : composition.

Unit – V

File handling, serialization using JSON and pickle, encoding and decoding.

Learning Resources

1. Allen B. Downey, Think Python, 2nd Edition, Green Tea Press
2. "Learning Python", 5th Edition, O'reilly
3. <https://www.python.org>
4. <https://nptel.ac.in/courses/106106182/>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF MECHANICAL ENGINEERING

OPTIMIZATION METHODS (Open Elective-II)

SYLLABUS FOR B.E.IV-SEMESTER

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U19OE410ME
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of this course are to:	On completion of the course, students will be able to
understand Linear & non-linear programming, transportation modeling , CPM & PERT for project scheduling and control, and application of various optimization techniques for respective field engineering (Inter disciplinary)	<ol style="list-style-type: none">1. Optimization of resources in multi disciplinary areas through linear programming under different conditions.2. Sensitivity analysis of a linear programming problem as per customer requirements to suit various Organizations.3. Minimization of total cost to apply for transportation techniques for the transshipment of Goods and products and Implement techniques like project management to analyze about material management.4. Optimization of resources in multi disciplinary areas through non-linear programming under different conditions.

UNIT-I

Optimization-An overview

Meaning of Optimization-Origin of Optimization-Introduction to Linear programming problems (LPP) -Formulation of LPP- Graphical method, simplex method.

UNIT-II

Advanced topics in Linear programming

Duality in LPP, Differences between primal and dual, shadow prices, Dual simplex method, sensitivity analysis. special cases in LPP.

UNIT-III

Transportation Model

Definition of the transportation model-matrix of Transportation model-Formulation and solution of transportation models- Methods for calculating Initial basic feasible solution-Optimization of transportation model using MODI method.

Project Scheduling

Introduction to network analysis, Rules to draw network diagram, Fulkerson rule for numbering events, Critical path method, PERT.

UNIT-IV

Non linear programming problems

Optimization methods for single variable, multivariable functions, Maxima-Minima

One Dimensional Minimization: Uni-modal Function, Unrestricted search, Exhaustive search, Dichotomous search, Interval Halving method, Fibonacci and golden bisection Method , Newton and Quasi Newton method.

UNIT-V

Non Linear - Unconstrained optimization: classification, scaling of design variables, Random search methods, Univariate search, pattern Directions, Hook Jeeves, Powel method, Rosenbrock method.

Learning Resources:

1. Singiresu S. Rao, "Engineering optimization- Theory and Practice", 4th Edition, John Wiley and Sons, 2009.
2. NVS Raju, "Optimization methods for Engineers ", PHI Learning Pvt. Ltd., 2014.
3. Prem Kumar Gupta and Dr. DS Hira, "Operations Research ", S.Chand & Company Pvt. Ltd., 2014.

4. R. Paneerselvam, "Operations Research", PHI Learning Pvt Ltd., 2009.
5. Kalyanmoy Deb, Optimization for Engineering Design- algorithms and examples, PHI pvt ltd, 1st edition 2003, Delhi.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

- | | | | | | |
|--------------------------|---|--------------------------------|-----------------------------------|---|---------------------------------|
| 1. No. of Internal Tests | : | <input type="text" value="2"/> | Max. Marks for each Internal Test | : | <input type="text" value="30"/> |
| 2. No. of Assignments | : | <input type="text" value="3"/> | Max. Marks for each Assignment | : | <input type="text" value="5"/> |
| 3. No. of Quizzes | : | <input type="text" value="3"/> | Max. Marks for each Quiz Test | : | <input type="text" value="5"/> |

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad-500031, Telangana State

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

CRITICAL THINKING (Open Elective-II)

SYLLABUS FOR B.E.IV-SEMESTER

L:T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U19OE410EH
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of this course are to:	On completion of the course, students will be able to
To help students: <ul style="list-style-type: none">Identify the core skills associated with critical thinking.Comprehend the various techniques of critical thinking.Understand where to look for bias and assumptions in problem analysisUnderstand Structure, standards, and ethics of critical thinking	<ul style="list-style-type: none">Analyse and use techniques for comparing alternative solutionsDemonstrate the difference between deductive and inductive reasoning.Construct a logically sound and well-reasoned argument.Evaluate, identify, and distinguish between relevant and irrelevant informationFormulate a thesis or HypothesisEmploying Evidence/Information Effectively

UNIT I - Components of Critical Thinking

1. Applying Reason
2. Open Mindedness
3. Analysis
4. Logic

UNIT II - Non-Linear Thinking

1. Step Out of Your Comfort Zone
2. Don't Jump to Conclusions
3. Expect and Initiate Change
4. Being Ready to Adapt

UNIT III - Logical Thinking

1. Ask the Right Questions
2. Organize the Data
3. Evaluate the Information
4. Draw Conclusions

UNIT IV - Evaluate Information

1. Making Assumptions
2. Watch out for Bias
3. Ask Clarifying Questions
4. SWOT Analysis

UNIT-V - Problem Solving

1. Identify Inconsistencies
2. Trust Your Instincts
3. Asking Why?

METHODOLOGY:-

Case Studies
Demonstration
Expert lectures
Writing and Audio-visual lessons

ASSESSMENT :-

Online assignments
Individual and Group Presentations

Learning Resources:-

1. Critical Thinking: A Beginner`s Guide to Critical Thinking, Better Decision Making, and Problem Solving-Jennifer Wilson
2. Wait, What? And Life`s Other Essential Questions – James E.Ryan
3. Think Smarter: Critical Thinking to Improve problem-solving and Decision Making skill -Michael Kallet
4. The Art of Thinking Clearly-Rolf Dobelli

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 minutes