R19

B.Tech – CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
Course Structure

INDUCTION PROGRAM (MANDATORY)	3 WEEKS DURATION
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch &Innovations

I B. Tech. – I Semester (C.E)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19HS0848	Engineering Physics	3	1	-	4
2	19HS0830	Algebra and Calculus	3	-	-	3
3	19HS0810	Communicative English	3	-	-	3
4	19CE0101	Engineering Mechanics	2	1	-	3
5	19HS0852	Engineering Physics Lab	-	-	3	1.5
6	19HS0811	Communicative English Lab	-	-	3	1.5
7	19ME0301	Workshop Practice Lab	-	-	4	2
Contact periods / week			11	2	10	**18**
			Total/Week **23**			

I B. Tech. – II Semester (C.E)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19HS0802	Engineering Chemistry	3	1	-	4
2	19HS0831	Differential Equations and Vector Calculus	3	1	-	4
3	19CE0102	Strength of Materials – I	3	-	-	3
4	19CS0501	Python Programming	3	-	-	3
5	19ME0302	Engineering Graphics	1	-	4	3
6	19HS0806	Engineering Chemistry Lab	-	-	3	1.5
7	19CS0502	Python Programming Lab	-	-	3	1.5
Audit Course						
8	19HS0816	Indian Constitution	3	-	-	-
Contact periods / week			16	2	10	**20**
			Total/Week **28**			

II B. Tech. – I Semester (C.E)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19ME0345	Basic Electrical & Mechanical Engineering	3	-	-	3
2	19CE0103	Strength of Materials - II	3	1	-	4
3	19CE0104	Surveying & Geomatics	3	-	-	3
4	19CE0105	Building Materials & Construction	3	-	-	3
Open Elective – I						
5	19EE0238	Generation of Energy through Waste	3	-	-	3
	19ME0349	Fundamentals of Mechanical Engineering				
	19EC0448	Introduction to Communication Systems				
	19CS0550	Relational Database Management System				
	19HS0813	Management Science				
6	19CE0106	Strength of Materials Lab	-	-	3	1.5
7	19CE0107	Surveying Lab	-	-	3	1.5
8	19CE0108	Computer Aided Drawing Lab	-	-	2	1.0
Audit Course						
9	19HS0805	Environmental Science	3	-	-	-
Contact periods / week			18	1	8	**20**
			Total/Week **27**			

II B. Tech. – II Semester (C.E)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19HS0833	Numerical Methods, Probability & Statistics	4	-	-	4
2	19CE0109	Fluid Mechanics	3	-	-	3
3	19CE0110	Engineering Geology	3	-	-	3
4	19CE0111	Structural Analysis	3	-	-	3
Open Elective - II						
5	19EE0233	Industrial Instrumentation	3	-	-	3
	19ME0350	Mechanical Measurements & Control Systems				
	19EC0449	Element of Embedded Systems				
	19CS0551	Java Programming				
	19HS0814	Intellectual Property Rights				
6	19CE0112	Fluid Mechanics & Hydraulic Machinery Lab	-	-	3	1.5
7	19CE0113	Engineering Geology Lab	-	-	3	1.5
8	19CE0114	GIS Lab	-	-	2	1.0
Audit Course						
9	19HS0817	Essence of Indian Traditional Knowledge	3	-	-	-
Contact periods / week			18	1	8	**20**
			Total/Week **27**			

III B. Tech. – I Semester (C.E)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19CE0115	Estimation, Costing and Valuation	3	1	-	4
2	19CE0116	Hydraulic Engineering	3	-	-	3
3	19CE0117	Geotechnical Engineering	3	-	-	3
4	19CE0118	Transportation Engineering	3	-	-	3
5	**Open Elective – III**		3	-	-	3
	19EE0239	Solar Photovoltaic Systems				
	19ME0321	Non-Conventional Energy Resources				
	19EC0450	Introduction to IOT				
	19CS0545	Software Development & Testing				
	19HS0861	Business Ethics				
6	19CE0119	Geotechnical Engineering Lab	-	-	3	1.5
7	19CE0120	Concrete & Highway Materials Lab	-	-	3	1.5
8	19CE0121	Surveying Camp (2 Weeks)	-	-	-	1.0
Audit Course						
9	19HS0858	Human Values and Professional Ethics	3	-	-	-
Contact periods / week			18	1	6	**20**
			Total/Week		**25**	

III B. Tech. – II Semester (C.E)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19CE0122	Structural Design	3	1	-	4
2	19CE0123	Hydrology & Water Resources Engineering	3	-	-	3
3	19CE0124	Construction Project Management	3	-	-	3
4	19CE0125	Environmental Engineering	3	-	-	3
5	**Open Elective – IV**		3	-	-	3
	19EE0231	Neural Networks and Fuzzy Logic				
	19ME0353	Computer Aided Process Planning				
	19EC0451	MATLAB Programming				
	19CS0546	Introduction to Cyber Security				
	19HS0862	Strategic Management				
6	19CE0126	Environmental Engineering Lab	-	-	3	1.5
7	19CE0127	Computer Aided Design Lab	-	-	3	1.5
8	19CE0128	Virtual Lab in Civil Engineering	-	-	2	1.0
Audit Course						
9	19HS0859	English for Corporate Communication Skills lab	-	-	2	-
Contact periods / week			15	1	10	**20**
			Total/Week		**26**	

IV B. Tech. – I Semester (C.E)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	19HS0812	Managerial Economics and Financial Analysis	3	-	-	3
2	19CE0130	Foundation Engineering	3	-	-	3
3	19CE0131	Concrete Technology	3	-	-	3
4	**Professional Elective Course – I**					
	19CE0138	Finite Element Method	3	-	-	3
	19CE0139	Environmental Impact Assessment & Management				
	19CE0140	Maintenance & Rehabilitation of Structures				
5	**Professional Elective Course – II**					
	19CE0141	Advanced Structural Design	3	-	-	3
	19CE0142	Airport Planning and Design				
	19CE0143	Fundamentals of Urban Planning				
6	**Professional Elective Course – III**					
	19CE0144	Design & Drawing of Irrigation Structures	3	-	-	3
	19CE0145	Traffic Engineering and Management				
	19CE0146	Prestressed Concrete				
7	19CE0132	Internship (60 hr.)	-	-	-	3
8	19CE0133	Project Phase – I	-	-	4	2
Contact periods / week			18	-	4	**23**
			Total/Week		**22**	

IV B. Tech. – II Semester (C.E)

S.No	Course Code	Subject	L	T	P/ Drg	C
1	**MOOC**		3	-	-	3
2	19CE0134	Seminar	-	-	6	3
3	19CE0135	Comprehensive Viva Voce	-	-	-	2
4	19CE0137	Project Phase – II	-	-	22	11
Contact periods / week			3		28	**19**
			Total/Week		**31**	

Note: L – Lecture hours, T – Tutorial, P – Practical, Drg. – Drawing, C – Credits

Year	I Year		II Year		III Year		IV Year		Total
Semester	I Sem	II Sem	I Sem	II Sem	I Sem	II Sem	I Sem	II Sem	
Credits	18	20	20	20	20	20	23	19	160

Total Credits: 160

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I B.Tech – I Sem.

L	T	P	C
3	1	-	4

(19HS0848) ENGINEERING PHYSICS

COURSE OBJECTIVES

1. *To impart knowledge in basic concepts of various forces & Frames of References*
2. *Key points related to Physics of Solids*
3. *To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications*
4. *To recognize the various basic terms related to Oscillations*
5. *To understand the fundamentals of Nano Science & Technology*

COURSE OUTCOMES

After completing this course, students will be able to

1. *Explains various terms related to Vectors & Scalars and Newton's laws of motion*
2. *Apply the principles of acoustics in designing of buildings*
3. *Explains the applications of ultrasonics in various engineering fields*
4. *Explains various terms related to waves and Oscillations*
5. *Explains the importance of various mechanical properties of materials*
6. *Apply the basic properties of nanomaterials in various engineering branches*

UNIT – I

MOTION OF PARTICLES

Basic laws of vectors and scalars-conservative forces- F = - grad V, torque and angular momentum - Newton's laws, Inertial and non-inertial frames of reference-rotating frame of reference with constant angular velocity- Centre of Mass – Gravitation and Kepler's Laws (Qualitative)

UNIT – II

PHYSICS OF SOLIDS

Elasticity and isotropic materials, Stress, Types of stresses, Strain, Types of strains, longitudinal strain, volume strain and shearing strain and Hooke's Law- Behaviour of wire under the load, Elastic modulus's of solids, Poisson's ratio. Internal energy due to strain – Beams- classification-types of support

UNIT – III

ACOUSTICS AND ULTRASONICS

ACOUSTICS: Introduction – Reverberation – Reverberation time – Sabine's formula-Derivation of Sabine's formula, Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies

ULTRASONICS: Introduction- Properties and Production by piezoelectric method – Detection methods –Applications of ultrasonics

UNIT – IV

HARMONIC OSCILLATORS

Simple Harmonic oscillator and solution of differential equation- Damped harmonic motion and solution of differential equation – over damped, critically damped and lightly damped oscillators- Forced oscillations and resonance (qualitative treatment)

UNIT-V

PHYSICS OF NANOMATERIALS

Introduction, Nano science and Nanotechnology – Surface area to volume ratio and Quantum confinement- Classifications of Nanomaterials – Advantages of nanotechnology, Synthesis of nanomaterials- Top Down Process- Ball Milling; Bottom Up Process: Sol-Gel method- Applications.

TEXTBOOKS

1. M.N.Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, *A Text book of Engineering Physics*, S.Chand Publications, 11th Edition, 2019
2. K.Thyagarajan, *Engineering Physics*, McGraw-Hill Education Private Ltd, New Delhi

REFERENCES

1. MK Harbola, *Engineering Mechanics*, Cengage Learning Publications,2nd ed.2012
2. JL Meriam, LG.Kraige and JN.Bolton, *Engineering Mechanics – Dynamics*, Wiley Publications, 7th edition, 2018
3. SH Crandall, NC Dahl & TJ Lardner, *An Introduction to the Mechanics of Solids*, Tata McGraw Hill Education,3rd edition, 2017(with SI Units)
4. M K Varma, *Introduction to Mechanics*, Taylor & Francis Group, 4th Ed, 2019
5. D.K. Bhattacharya and A. Bhaskaran, *Engineering Physics* - Oxford Publications, 2015

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(19HS0830) ALGEBRA AND CALCULUS

COURSE OBJECTIVES

1. *This course will illuminate the students in the concepts of calculus and linear algebra*
2. *To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications*
3. *To evaluate multiple integrals in Cartesian, cylindrical and spherical geometries*

COURSE OUTCOMES

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

UNIT – I

Matrices: Rank of a matrix by echelon form - Solutions of system of homogeneous and non-homogeneous linear equations - Eigen values and Eigen vectors and their properties -Cayley-Hamilton theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton theorem - Diagonalization of a matrix - Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation

UNIT – II

Calculus and Mean Value Theorems: Rolle's Theorem - Lagrange's mean value theorem - Cauchy's mean value theorem - Taylor's and Maclaurin's theorems (without proofs)

UNIT – III

Multivariable Calculus: Partial derivatives - Total derivatives - Chain rule - Jacobians - Functional dependence - Maxima and minima of functions of two variables - Method of Lagrange multipliers

UNIT – IV

Integral Calculus: Evaluation of definite and improper integrals (single variable)

Multiple Integration: Double integrals (Cartesian) - Change of order of integration in double integrals - Change of variables (Cartesian to polar) - Evaluation of Triple integrals (Cartesian)

UNIT – V

Special Functions: Beta and Gamma functions and their properties - Relation between Beta and Gamma functions - Evaluation of definite integrals using Beta and Gamma functions

TEXTBOOKS

1. B. S. Grewal, *Higher Engineering Mathematics* ,Khanna Publishers,42nd Edition, 2017
2. B. V. Ramana, *Higher Engineering Mathematics*, Tata McGraw Hill Companies, Third Edition

REFERENCES

1. T.K.V. Iyengar, *Engineering Mathematics, Volume-I*, S.Chand Publication, 5th Edition, 2010
2. T.K.V. Iyengar, *Engineering Mathematics, Volume-II*, S.Chand Publication, 5th Revised Edition, 2011
3. T.K.V. Iyengar, *Engineering Mathematics, Volume-III*, S.Chand Publication, 10th Revised Edition, 2015
4. E.Rukmangadachari, *Engineering Mathematics, Volume-I*, Pearson Publishers, 1st Edition, 2015
5. Dr.C. Sankaraiah, *Mathematical Methods*, Unitech series, First Edition, 2008

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L	T	P	C
3	-	-	3

(19HS0810) COMMUNICATIVE ENGLISH

COURSE OBJECTIVES

1. *To facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers*
2. *To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials*
3. *To help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations*
4. *To impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information*
5. *To provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing*

COURSE OUTCOMES

1. *To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information*
2. *To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information*
3. *To Participate in informal discussions and speak clearly on a specific topic or in general*
4. *To comprehend, discuss and respond to academic texts and use appropriate language for description and interpretation in writing*
5. *To form sentences using proper grammatical structures and correct word forms*

UNIT – I

Part-1

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Writing:** Beginnings and endings of paragraphs - introducing the topic, Letter writing. **Grammar and Vocabulary:** Parts of speech; singular and plural; Basic sentence structures; simple question form - wh-questions; word order in sentences and Content words

Part-2

Half a Rupee Worth by R K Narayan from Engage with English

UNIT – II

Part-1

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts **Speaking:** Discussion in pairs/ small groups on specific topics followed by short

structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing: M**echanics of writing - punctuations **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero articles; prepositions and function words

Part-2

The Thakur's Well by Premchand from Paths to Skills in English

UNIT – III

Part-1

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing Report Writing. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes and word forms

Part-2

I am not that Woman by Kishwar Naheed from Engage with English

UNIT – IV

Part-1

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video **Speaking:** conversational English in academic contexts (formal and informal). **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of synonyms and antonyms

Part-2

What is my name? By Sathyavathi from Paths to Skills in English

UNIT – V

Part-1

Listening: Identifying key terms **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).

Part-2

The Power of Prayer by A P J Abdul Kalam from Paths to Skills in English

TEXTBOOKS

1. Board of Editors, *Engage with English,* Orient Blackswan First Edition, 2016
2. Prof. G.M. Sundaravalli & A.S.Kamalakar, *Paths to Skills in English*, Orient Blackswan, First Edition, 2015

REFERENCES

1. Bailey, Stephen, *Academic Writing: A handbook for international students*, Routledge, 2014
2. Chase, Becky Tarver, *Pathways: Listening, Speaking and Critical Thinking*, Heinley ELT; 2nd Edition, 2018
3. Hewings, Martin, *Cambridge Academic English (B2)*, CUP, 2012
4. Eric H.Glendinning & Beverly Holmström, *Study Reading: A Course in Reading Skills for Academic Purposes*, Cambridge University Press; 2nd edition, 14 October 2004

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I B.Tech – I Sem.

L	T	P	C
2	1	-	3

(19CE0101) ENGINEERING MECHANICS

COURSE OBJECTIVES

1. To learn about forces and force systems and their applications
2. To learn about friction and to use the concept of Friction
3. To learn how to find centroid of different objects using Mathematical formula
4. To learn how to find Moments of Inertia of different objects using Mathematical formula

COURSE OUTCOMES

1. *Construct free body diagrams and develop appropriate equilibrium equations*
2. *Understand the concepts of friction and to apply in real life problems*
3. *Determine the centroid for composite sections*
4. *Determine the Moment of Inertia for composite sections*

UNIT – I

FORCES & FORCE SYSTEMS: Fundamental Principles – Resolution and Composition of Forces and Equilibrium of Particles – Lami‘s Theorem - Principle of Transmissibility – Principles of Continuum - Types of Force Systems – Resultant of Coplanar, Concurrent and Non-Concurrent Force Systems -Varignon‘s Theorem - Equilibrium of Coplanar Force Systems – Types of Beams and Supports – Support Reactions

UNIT – II

FRICTION: Types of Friction – Laws of Friction – Limiting Friction – Cone of Limiting Friction - Ladder Friction - Wedge, Screw jack and differential Screw Jack

UNIT – III

CENTROID: Centroids of Simple Figures (From Basic Principles) – Centroids of Composite Figures

CENTRE OF GRAVITY: Centre of Gravity of Simple Body -Centre of Gravity of Composite Bodies- Pappus Theorem

UNIT – IV

MOMENT OF INERTIA: Definition – Parallel Axis Theorem and Perpendicular Axis Theorem – Polar Moment of Inertia – Radius of Gyration – Moment of Inertia of Basic Shapes - Composite Sections - Simple Solids

UNIT – V

ANALYSIS OF PERFECT TRUSSES: Types of Trusses – Perfect, Deficient and Redundant Trusses - Cantilever Trusses and Simply Supported Trusses – Analysis of Trusses using Method of Joints and Methods of Sections.

TEXT BOOKS

1. Bhavikatti S, *A Textbook of Engineering Mechanics*, B.S. New Age International, 3rd Edition, 2016
2. Dr. R. K. Bansal, *Engineering Mechanics*, Laxmi Publications, 4th Edition, 2011

REFERENCES

1. D.S. Kumar, *Engineering Mechanics*, S.K. KATARIA & SONS, 3rd Edition
2. K.Vijaya Kumar Reddy, J. Suresh Kumar, *Singer's Engineering Mechanics: Statics and Dynamics*, 3rd Edition, B.S. Publications,2011
3. J L Meriam, L G Kraige, *Engineering Mechanics: Statics*, Wiley India Pvt. Ltd, 6th Edition, 2001
4. J L Meriam, L G Kraige, *Engineering Mechanics: Dynamics*, Wiley India Pvt. Ltd, 6th Edition, 2010

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I B.Tech – I Sem.

L	T	P	C
-	-	3	1.5

(19HS0852) ENGINEERING PHYSICS LAB

COURSE OBJECTIVES

1. *To explore the application of Interference and Diffraction by doing concerned experiments*
2. *Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge*
3. *To understand the concept of energy gap, B-H curve and resonance phenomena in LCR circuits*
4. *Develop an ability to apply the knowledge of physics experiments in the later studies*

COURSE OUTCOMES

The students will be able to

1. *Operate various optical instruments*
2. *Estimate wavelength of laser and particles size using laser*
3. *Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance*
4. *Evaluate the acceptance angle of an optical fiber and numerical aperture*
5. *Determine energy loss by B-H curve*

Suggested list of experiments from the following: (Perform any TEN experiments from the following)

1. Determination of wavelengths of various colors of Mercury vapor lamp using Diffraction Grating – Normal Incidence method
2. Determination of Dispersive power of prism
3. Rigidity Modulus – Torsional Pendulum
4. Determination of thickness of thin object by wedge method
5. Determination of radius of curvature of Plano convex lens – Newton's Rings
6. Determination of wavelength of a given laser source by using diffraction grating
7. Determination of particle size (Lycopodium particles deposited on glass plates) using Laser source
8. Determination of energy gap of a semiconductor using p – n junction diode B- H curve
9. Magnetic field along the axis of current carrying coil – Stewart & Gee's Method
10. Determination of frequency of tuning fork - Melde's Apparatus
11. Determination of Spring constant – Coupled Oscillator
12. Determination of di electric constant of dielectric material using charging and discharging of capacitor
13. Determination of Numerical Aperture of an Optical fiber
14. Measurement of resistance with varying temperature –Thermistor

REFERENCES

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

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L	T	P	C
-	-	3	1.5

(19HS0811) COMMUNICATIVE ENGLISH LAB

COURSE OBJECTIVES

1. *Students will be exposed to a variety of self-instructional, learner friendly modes of language learning*
2. *Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.*
3. *Students will learn better pronunciation through stress, intonation and rhythm*
4. *Students will be trained to use language effectively to face interviews, group discussions, public speaking*
5. *Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.*

COURSE OUTCOMES

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

UNIT – I

Part-1

Introduction to Phonetics

Part-2

Word Stress- Intonation

UNIT – II

Part-1

JAM - Oral Presentation

Part-2

Describing objects/places/persons- Minutes of Meeting

UNIT – III

Part-1

Situational dialogues – Greeting and Introduction -Telephonic Conversations

Part-2

Book Review-Report Writing

UNIT – IV

Part-1

Non-verbal Communication – Dumb Charade

Part-2

Debate/Group Discussion- Movie Review- Reading Comprehension

UNIT – V

Part-1

Information Transfer

Part-2

Job Application and Resume Writing - Interview Skills

Suggested Software:

1. Walden InfoTech Software

REFERENCES

1. T. Balasubramanian, *A Textbook of English Phonetics for Indian Students,* Mcmillian second edition, 2012
2. DhamijaSethi, *A Course in Phonetics and Spoken English,* Prentice-hall of India Pvt. Ltd,2000
3. Krishna Mohan & NP Singh, *Speaking English Effectively,* Mcmillian, Second Edition, 2011
4. E.Sureshkumar & P.Sreehari, *A Hand Book of English Laboratories* Foundation books, 2011
5. M Ashraf Rizvi, *Effective Technical Communication,* McGraw Hill Education, Second edition,27 July 2017

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I B.Tech – I Sem.

L	T	P	C
-	-	4	2

(19ME0301) WORKSHOP PRACTICE LAB

COURSE OBJECTIVES

1. *To familiarize with the basic manufacturing processes and to study the various tools and equipment*
2. *The course provides hands-on training in the trades of Carpentry, Fitting, House-wiring, and Tin Smithy*
3. *Overview of metal cutting processes, plumbing is provided through live demonstrations*
4. *To know the labour involved, machinery or equipment necessary, time required to fabricate*
5. *To acquire practical skills by performing the experiments in different shops of workshop*

COURSE OUTCOMES

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

LIST OF EXPERIMENTS

Carpentry: Familiarity with different types of woods and tools used in wood working and make following joints

1. T-Bridle joint
2. Corner Dovetail joint

Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job using GI sheets.

1. Tapered tray
2. Conical funnel

Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises

1. Step Fitting
2. V-Fit

Electrical Wiring:

Familiarity with different types of basic electrical circuits and makes the following connections

1. Parallel and series
2. Two way switch
3. Go down lighting

4. Tube light
5. Three phase motor
6. Soldering of wires

PART B - IT WORKSHOP

COURSE OBJECTIVES

To provide students with hands-on experience in

1. *Basic hardware*
2. *Productivity tools like MS Office*
3. *Basic operating system installations*

COURSE OUTCOMES

After Completion of this Course the Student would be able to

1. *Identify the basic computer peripherals*
2. *Gain sufficient knowledge on assembling and disassembling a PC*
3. *Learn the installation procedure of Windows and Linux OS*
4. *Acquire knowledge on basic networking infrastructure*
5. *Learn productivity tools like Word, Excel and Power point*
6. *Acquire knowledge on basics of internet and worldwide web*

TASK 1:

Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions Description of various I/O Devices

TASK 2:

A practice on disassembling the components of a PC and assembling them

TASK 3:

1. Basic DOS commands, Installation of MS windows
2. Basic Linux Commands, Installation of Linux

TASK 4:

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals). Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

PRODUCTIVITY TOOLS

TASK 5:

1. **MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving
2. **Presentations:** Creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running

the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered

3. **Spread sheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered

TASK 6:

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented

REFERENCES

1. Peter Norton, *Introduction to Computers*, McGraw Hill, 2001
2. Joan Lambert, Joyce Cox, *MOS study guide for word, Excel, Power point & amp, Outlook Exams*, PHI, 2008
3. ITL Education Solutions limited, *Introduction to Information Technology*, Pearson Education.2009
4. Rusen, *Networking your Computers and Devices*, PHI, 2009
5. Bigelows, *Trouble shooting, Maintaining & amp; Repairing PCs*, TMH, 2010

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(19HS0802) ENGINEERING CHEMISTRY

COURSE OBJECTIVES

1. *To familiarize engineering chemistry and its applications*
2. *To impart the concept of soft and hard waters, softening methods of hard water*
3. *To train the students on the principles and applications of electrochemistry, polymers, surface chemistry and cement*

COURSE OUTCOMES

1. *List the differences between temporary and permanent hardness of water, explain the principles of reverse osmosis and electro dialysis. Compare quality of drinking water with BIS and WHO standards.*
2. *Apply Nernst equation for calculating electrode and cell potentials, apply Pilling-Bedworth rule for corrosion and corrosion prevention, demonstrate the corrosion prevention methods and factors affecting corrosion, compare different batteries and their applications*
3. *Explain different types of polymers and their applications, solve the numerical problems based on Calorific value, select suitable fuels for IC engines, explain calorific values, octane number, refining of petroleum and cracking of oils.*
4. *Explain the constituents of Composites and its classification identify the factors affecting the refractory material, illustrate the functions and properties of lubricants, and demonstrate the phases and reactivity of concrete formation.*
5. *summarize the applications of SEM, TEM and X-ray diffraction in surface characterization, explain the synthesis of colloids with examples, outline the preparation of nanomaterials and metal oxides identify the application of colloids and nanomaterials in medicine, sensors and catalysis*

UNIT – I

WATER TECHNOLOGY: Introduction, Soft water and Hardness of water, Estimation of hardness by EDTA Method - Boiler troubles, Municipal water treatment, Industrial water treatment, Specifications for drinking water - Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards, Zeolite and Ion-exchange processes. Desalination of brackish water - Reverse osmosis (RO) and Electro dialysis

UNIT – II

ELECTROCHEMISTRY AND APPLICATIONS: Electrochemical cell, Nernst equation, Cell potential calculations. Primary cells Li Battery. Secondary cells-Lead acid Battery and Lithium ion cell (Rechargeable) - working of the batteries including cell reactions. Fuel cells-Basics principles and working principles of Hydrogen - Oxygen, Methanol-Oxygen fuel cells.

CORROSION: Introduction to Corrosion, Types of Corrosion (Chemical or Dry Corrosion, Electrochemical or Wet corrosion), Differential aeration cell corrosion, Galvanic corrosion,

Pilling-Bedworth ratios and uses, Factors affecting the corrosion- Cathodic and Anodic protection, Electroplating (Nickel and Copper) and Electro less plating

UNIT – III

POLYMERS AND FUEL CHEMISTRY: Introduction to Polymers, Functionality of monomers Nomenclature of Polymers, Mechanism of Chain growth, Step growth polymerization. Thermoplastics and Thermosetting plastics- preparation, properties and applications of PVC and Bakelite - Elastomers – Preparation, properties and applications of Buna-S,Buna-N, Thikol

FUELS- Types of fuels, Calorific value, Numerical problems based on calorific value, Analysis of coal, Liquid fuels, Refining of Petroleum, Fuels for IC engines, Knocking and Anti-knock agents, Octane and Cetane values, Cracking of oils, Alternative fuels- Propane, Methanol Ethanol and Bio fuels

UNIT – IV

BASIC ENGINEERING MATERIALS: Composites - Definition, Constituents, Classification-Particle, Fibre and Structural reinforced composites, Properties and Engineering applications. Refractories- Classification, Properties- Lubricants- Classification, Mechanism, Properties of lubricating oils and Applications- Building materials- Manufacture of Portland Cement, constituents, phases and reactivity of clinker, Setting and Hardening of Cement

UNIT – V

SURFACE CHEMISTRY AND APPLICATIONS: Introduction to Surface chemistry, Colloids, Micelle formation, Synthesis of colloids (any two methods with examples), Chemical and Electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, Stabilization of colloids and nanomaterials by stabilizing agents, Characterization of surface by physicochemical methods (SEM, TEM, X-ray diffraction), Solid-gas interface, Solid-liquid interface, adsorption isotherm, BET equation (no derivation), Applications of colloids and Nanomaterials – catalysis, medicine, sensors, etc.

TEXTBOOKS

1. KN Jayaveera, GV Subba Reddy and C. Ramachandraiah, *Engineering Chemistry*, McGraw Hill Higher Education, Fourth Edition, New Delhi, 2019
2. Jain and Jain, *A Text Book of Engineering Chemistry*, Dhanapathi Rai Publications, New Delhi, 2010

REFERENCES

1. S.S Dhara, *A Text book of Engineering Chemistry*, S. Chand Publications, New Delhi, 2010
2. K.B.ChandraSekhar, UN.Das and Sujatha Mishra, *Engineering Chemistry*, SCITECH Publications India Pvt Limited, 2015
3. H.D. Gesser, *Applied Chemistry*, Springer International Edition, 2010

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(19HS0831) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

COURSE OBJECTIVES

1. *To enlighten the learners in the concept of differential equations and multivariable calculus*
2. *To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications*
3. *To develop the skill pertinent to the practice of the mathematical concepts including the students' abilities to formulate and modelling the problems, to think creatively and to synthesize information*

COURSE OUTCOMES

1. *Solve the differential equations related to various engineering fields*
2. *Identify solution methods for partial differential equations that model physical processes*
3. *Interpret the physical meaning of different operators such as gradient, curl and divergence*
4. *Estimate the work done against a field, circulation using vector calculus*
5. *5.Students will become familiar with applications of surface and volume integrals*

UNIT – I

First and Higher Order Ordinary Differential Equation: Exact - Linear and Bernoulli's equations - Second order linear differential equations with constant coefficients with R.H.S term of the types e^{ax} , sinax, cosax, polynomials in x^n ,e^{ax} V(x)

UNIT – II

Equations Reducible to Linear Differential Equations: Method of variation of parameters - Cauchy's and Legendre's linear equations - Simultaneous linear equations with constant coefficients - Applications to L-C-R Circuit problems

UNIT – III

Partial Differential Equations: Formation of P.D.E by eliminating arbitrary constants and functions

Solutions of P.D.E: Equations solvable by direct integration - Linear and non-linear equations of first order - Method of separation of variables

UNIT – IV

Vector Differentiation: Scalar and vector point functions - Vector operator del - Del applies to scalar point functions – Gradient - Del applied to vector point functions - Divergence and Curl - Vector identities

UNIT – V

Vector Integration: Line integral – Circulation - Work done - Surface and volume integrals

Integral Theorems: Green's theorem in the plane (without proof) - Stoke's theorem (without proof) - Divergence theorem (without proof) - applications of these theorems

TEXTBOOKS

1. Dr. Shahnaz Bathul, *Engineering Mathematics*, Overseas Publishers PV.L.T, Fourth Edition,2008
2. T.K.V.Iyengar, *Engineering Mathematics Volume-I*, S.Chand Publication,5th Edition, 2010

REFERENCES

1. E.Rukmangadachari & E.Keshava Reddy, *Engineering Mathematics volume-I*, Pearson Publishers, 1st edition, 2015
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 42nd Edition, 2017
3. Peter V.Oneil, *Advanced Engineering Mathematics*, Thomson Books, 5th Edition, 2003
4. Dr. A Anjauyulu, *Engineering Mathematics-I*, Deepthi Publications
5. Erwin Kreyszig. *Advanced Engineering Mathematics*, John Wiley Publications,8th Edition, 2000

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(19CE0102) STRENGTH OF MATERIALS-I

COURSE OBJECTIVES

1. To learn about simple stresses and strains and their applications
2. To learn how to find shear force and bending moment and construction of SFD & BMD
3. To understand about the concept of simple bending and shear stress distribution
4. To learn about deflections of Beams by using different methods
5. To learn about columns their applications

COURSE OUTCOMES

1. The students would be able to understand the behaviour of materials under different stress and strain conditions
2. The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading
3. The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams under various loading conditions
4. Determine shear stress in the shaft subjected to torsional moments
5. The students would be able to analyse columns and different types of loading condition on columns

UNIT – I

SIMPLE STRESSES AND STRAINS: Concept of stress and strain, St.Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains – Hooke's law– Factor of safety- Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – Composite bars – Temperature stresses.

COMPOUND STRESSES AND STRAINS: Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain. Relationship between elastic constants

UNIT – II

SHEAR FORCE AND BENDING MOMENTS: Types of supports and beams – Shear force and bending moment diagrams for cantilever, simply supported and over hanging beams with point loads, uniformly distributed load, uniformly varying loads and couples – Relationship between bending moment, shear force and loading

UNIT – III

THEORY OF SIMPLE BENDING: Assumptions in the theory of simple bending – Derivation of bending equation: $M/I = f/y = E/R$

SHEAR STRESS DISTRIBUTION: Derivation of formula – Shear stress distribution in rectangular, triangular, circular, I and T sections

UNIT – IV

DEFLECTIONS OF BEAMS: Relationship between moment, slope and deflection – Calculation of Slope & Deflection for Cantilever and Simply Support Beam Using Moment area method, Macaulay's method and Conjugate Method

UNIT – V

COLUMNS: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns – assumptions– derivation of Euler's critical load formulae for various end conditions

TEXT BOOKS

1. Dr. R. K. Bansal, *A Textbook of Strength of Materials,* Laxmi Publications, Revised 4th Edition, 2011
2. R. S. Khurmi, *Strength of Materials,* S.Chand Publishing, 23rd Edition, 2012

REFERENCES

1. Dr. B. C. Punmia, Dr. Ashok Jain, Dr.Arun Kumar Jain, *Mechanics of Materials,* Laxmi Publications, Revised Edition, 2016
2. R. Subramanian, *Strength of Materials*, Oxford University Press, 3rd Edition
3. *An Introduction to the Mechanics of Solids.* New York, NY: McGraw Hill, 2nd Edition, 1979
4. Dr. R.K. Rajput, *Strength of Materials (Mechanics of Solids),* S. Chand Publishing, 6th Edition
5. Sadhu Singh, *Strength of Materials,* Khanna Publishers, 11th Edition

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(19CS0501) PYTHON PROGRAMMING

COURSE OBJECTIVES

1. *Introduction of Scripting Language*
2. *Exposure to various problem solving approaches of computer science*
3. *To introduce function-oriented programming paradigm*
4. *Exposure to solve the problems using object oriented concepts, exceptional handling*
5. *Exposure to solve the problems using Files, Regular Expressions and, Standard Libraries*

COURSE OUTCOMES

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

1. *Making Software easily right out of the box*
2. *Solve the problems using control structures, input and output statements*
3. *Summarize the features of lists, tuples, dictionaries, strings and files*
4. *Experience the usage of standard libraries, objects, and modules*
5. *To build the software for real needs*

UNIT- I

Introduction: Algorithms -Building blocks of flow-chart design -History of Python -Python features – Applications - Programming Using the REPL(Python Shell) - Running Python Scripts – Variables – Assignment – Keywords - Input-Output - Indentation

Data Types: Data Type – Types of data: Single Valued and Multi valued data types

Single Valued: Numbers - Strings and methods – Booleans

UNIT- II

Data Structures: Lists – Tuples – Sets - Dictionaries and Sequences - Indexing and slicing - Comprehensions -**Type Casting:** Conversion methods

Operators and Expressions: Operators-Types of operators - Expressions and order of evaluations

Control Flow: Simple if - if else- nested if - if-elif-else –looping: while and for -Jumping: break – continue - pass

UNIT-III

Functions - Defining Functions - Calling Functions - Passing Arguments - Keyword Arguments –Default Arguments - Variable-length arguments - Anonymous Functions - Fruitful Functions(Function Returning Values) - Nested functions - Recursive functions - Scope of the Variables in a Function - Global and Local Variables

Object Oriented Programming in Python: Classes - Class diagram – Constructor - Object-'self-variable'- Methods - Magic methods – Inheritance – Polymorphism - Method overloading - Overriding Methods

UNIT-IV

Modules: Creating modules - Import statement - From Import statement - Name spacing

Python packages: Introduction to PIP - Installing Packages via PIP (Numpy, Pandas, MatPlotlib etc.) - Using Python Packages

Exception Handling: Introduction - try except block - try else – finally - Raising Exceptions - User Defined Exceptions

Introduction to Regular Expressions – Searching and Matching

UNIT V

Functional Programming: Iterators and Generators - Maps and Filters

Files: Text files- Reading and Writing files - Command line arguments;

Brief Tour of the Standard Library - Dates and Times - Data Compression - Python Runtime Services – Mathematics - Data Management and Object Persistence

GUI Programming - Turtle Graphics

TEXT BOOKS

1. Vamsi Kurama, *Python Programming: A Modern Approach*, Pearson
2. Reema Thareja, *Python Programming - Using Problem Solving Approach*, First Edition (English, Paperback), Oxford University Press

REFERENCES

1. Mark Lutz, *Learning Python*, Orielly
2. Allen Downey, *Think Python*, Green Tea Press
3. W.Chun, *Core Python Programming*, Pearson.
4. Kenneth A. Lambert, *Introduction to Python*, Cengage
5. Michael T. Goodrich , Roberto Tamassia, Michael H. Goldwasser, *Data Structures and Algorithms in Python*, 1st Edition, kindle Edition

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(19ME0302) ENGINEERING GRAPHICS

COURSE OBJECTIVES

1. *Understand the importance graphics in engineering*
2. *To introduce the students to the "universal language of Engineers" for effective Communication through drafting*
3. *Develop the graphical skills for communication of concepts, ideas and design of engineering products through engineering drawings.*
4. *Increase ability to take data and transform it into graphic drawings*
5. *To familiarize the students in basic concept of conic sections, projections and development of objects*

COURSE OUTCOMES

1. *Graphically construct and understand the importance of mathematical curves in engineering applications*
2. *Able to draw the basic views related to projections of Points, Lines and Planes*
3. *Able to draw the projections of geometrical solids and sectional view of solids*
4. *Understand the concept of projection and acquire visualization skills, development of surfaces and interpenetrations of solids*
5. *To draw multi view orthographic and other projections including isometric view*

UNIT – I

Introduction To Engineering Drawing: Principles of Engineering Graphics and their significance - usage of Drawing instruments – lettering - Conic sections, Cycloids and Involutes

UNIT – II

Projections of Points: - Principles of Orthographic Projections-Conventions - Projections of Points

Projections Of Straight Lines: - Inclined to both the planes (Trapezoidal Method & Rotating line method) - simple problems only, Traces

Projections of Planes: Surface inclined to both reference planes

UNIT – III

Projections of Solids: Introduction – Projections of right regular solids-Prisms, Pyramids in different positions. (Inclined to one plane only)

Sections of Solids: Sectional Views of Right regular Solids - Prisms, Pyramids

UNIT – IV

Development Of Surfaces: - Development of surfaces of Right Regular Solids - Prisms, Pyramids

Interpenetration of Solids: Cylinder to Cylinder, Prism to Prism, Cone to Cone (simple Problems Only

UNIT – V

Orthographic Projections: - Principles of Orthographic projection, Conversion of objects from 3D to 2D

Isometric Projections: - Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids, Conversion of 2D to 3D

TEXT BOOKS

1. Basant Agarwal & CM Agarwal, *Engineering Drawing & Graphics*, McGraw Hill Education, 2013
2. N.D.Bhatt, *Engineering Drawing*, Charotar Publishers, 2011
3. K.L.Narayana, Kannaiah, *A Text Book of Engineering Drawing*, SciTech Publishers, 2010

REFERENCES

1. K.Venugopal, *A text Book of Engineering Drawing and Graphic*, New Age Publishing New Delhi, 2008
2. P.J.Shah, *A Text Book of Engineering Graphics*, S.Chand & Company Ltd., New Delhi, 2016
3. R.K.Dhawan, *A Text Book of Engineering Drawing*, S.Chand & Company Ltd., New Delhi, 2013

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(19HS0806) ENGINEERING CHEMISTRY LAB

COURSE OBJECTIVES

Verify the fundamental concepts with experiments

COURSE OUTCOMES

1. *Determine the cell constant and conductance of solutions*
2. *Prepare advanced polymer materials*
3. *Estimate the Iron and Calcium in cement*
4. *Calculate the hardness of water*
5. *Determination of conductivity of an acid*

LIST OF EXPERIMENTS

1. Conductometric Titration of Strong acid vs Strong base
2. Conductometric Titration of Weak acid vs. Strong base
3. Determination of Hardness of a Groundwater sample.
4. pH metric titration of Strong acid vs. Strong base,
5. Potentiometry - Determination of Redox potentials and emfs
6. Determination of Strength of an Acid in Pb-Acid battery
7. Preparation of a Polymer
8. Determination of viscosity of oil by Redwood Viscometer
9. Determination of percentage of Iron in Cement sample by Colorimetry
10. Estimation of Calcium in Port land Cement
11. Adsorption of Acetic acid by Charcoal
12. Determination of Percentage Moisture content in a Coal sample

TEXT BOOKS

1. J. Mendham et al, *Vogel's Text book of Quantitative Chemical Analysis,* Pearson Education, Sixth Edition, 2002
2. Chandra Sekhar, G.V. Subba Reddy and Jayaveera, *Chemistry Practical – Lab Manual*, McGraw Hill Higher Education, 2015

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(19CS0502) PYTHON PROGRAMMING LAB

COURSE OBJECTIVES

The course provides hands-on training in usage of basic concepts, control structures, data structures, object oriented programming, exceptional handling and plotting of graphical entities

COURSE OUTCOMES

After completion of this course, a successful student will have

1. *Ability to program on basic concepts, control structures*
2. *Ability to implement data structures and their operations*
3. *Ability to work on object oriented programming*
4. *Ability to handle exceptional handling and plotting of graphical entities*
5. *Ability to develop any real world problem*

LIST OF EXPERIMENTS

1. Implement the following tasks
   a) Write a python program to check whether the number is positive or negative.
   b) Write a python program to find whether a given number is even or odd.
   c) Write a python program to find biggest number among three numbers.
2. Implement the following tasks
   a) Write a python program to displaying reversal of a number.
   b) Write a python program to print factorial of a number
   c) Write a python program to generate prime numbers series up to N
3. Implement following problems using python script
   a) Swapping of two numbers with and without using temporary variable
   b) If the age of Ram, Sam, and Khan are input through the keyboard, write a python program to determine the eldest and youngest of the three
   c) Arithmetic operations (Addition, Subtraction, Multiplication, and Division) on integers. Input the two integer values and operator for performing arithmetic operation through keyboard
4. Implement the following tasks
   a) Implement the python program to generate the multiplication table
   b) Implement Python program to find sum of natural numbers
   c) If the first name of a student is input through the keyboard, write a program to display the vowels and consonants present in his/her name
5. Implement the following tasks
   a) The marks obtained by a student in 5 different subjects are input through the keyboard. Find the average and print the student grade as per the SIETK examination policy.
   b) Given a number x, determine whether it is Armstrong number or not.
   Hint: For example, 371 is an Armstrong number since 3**3 + 7**3 + 1**3 = 371. Write a program to find all Armstrong number in the range of 0 and 999

6. Implement the following tasks
   a) Write a Python script to
   - create a list
   - access elements from a list
   - slice lists
   - change or add elements to a list
   - delete or remove elements from a list

   b) Write a Python script to read the values from a list and to display largest and smallest numbers from list
   c) Write a Python script to compute the similarity between two lists
7. Implement the following tasks
   a) Write a Python script to read set of values from a Tuple to perform various operations
   b) Write a Python script to perform basic dictionary operations like insert, delete and Display
   c) Write a Python program to count the occurrence of each word in a given sentence
8. Implement the following tasks
   a) Write a Python script to create Telephone Directory using dictionary and list to perform basic functions such as Add entry, Search, Delete entry, Update entry, View and Exit
   b) Implement Python script to display power of given numbers using function
   c) Implement a Python program that takes a list of words and returns the length of the longest one using function
9. Implement the following tasks
   a) Implement Python program to perform various operations on string using string libraries
   b) Implement Python program to remove punctuations from a given string
   c) Write a Python program to change the case of the given string (convert the string from lower case to upper case). If the entered string is “computer”, your program should output “COMPUTER” without using library functions
10. Implement the following tasks
    a) Implement Python program to capitalize each word in a string. For example, the entered sentence “god helps only people who work hard” to be converted as “God Helps Only People Who Work Hard”
    b) Write a Python script to display file contents
    c) Write a Python script to copy file contents from one file to another
11. Implement the following tasks
    a) Write a Python script to combine two text files contents and print the number of lines, sentences, words, characters and file size.
    b) Write a Python commands to perform the following directory operations.
    - List Directories and Files
    - Making a New Directory
    - Renaming a Directory or a File
    - Removing Directory or File

12. Implement the following tasks
    a) Create a package named Cars and build three modules in it namely, BMW, Audi and Nissan. Illustrate the modules using class. Finally we create the __init__.py file. This file will

be placed inside Cars directory and can be left blank or we can put the initialization code into it

b) Write a python script to display following shapes using turtle

TEXT BOOKS

1. Vamsi Kurama, *Python Programming: A Modern Approach*, Pearson
2. Reema Thareja, *Python Programming - Using Problem Solving Approach*, First Edition (English, Paperback), Oxford University Press

REFERENCES

1. Mark Lutz, *Learning Python*, Orielly
2. Allen Downey, *Think Python*, Green Tea Press
3. W.Chun, *Core Python Programming*, Pearson
4. Kenneth A. Lambert, *Introduction to Python*, Cengage
5. Michael T. Goodrich , Roberto Tamassia, Michael H. Goldwasser, *Data Structures and Algorithms in Python*, 1st Edition, kindle Edition

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(19HS0816) INDIAN CONSTITUTION

COURSE OBJECTIVES

1. *To know the premises informing the twin themes of liberty and freedom from a civil rights perspective*
2. *To address the growth of Indian opinion regarding modern Indian intellectuals 'constitutional role*
3. *To address entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism*
4. *To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution*
5. *To acquire knowledge for various competitive examinations*

COURSE OUTCOMES

1. *Explain the key concepts of political economy*
2. *Analyze the significant developments in the political ideologies*
3. *Describe the salient features of the constitution of India interpret, integrate and critically*
4. *Analyze the political economy of Indian international relations and gain knowledge in Judiciary system*
5. *Apply their knowledge and skills acquired to write various competitive examinations*

UNIT-I

Introduction to the Constitution

UNIT-II

Historical Perspective of the Constitution of India- Salient features and characteristics of the Constitution of India

UNIT-III

Scheme of the fundamental rights-The scheme of the Fundamental Duties and its legal status-The Directive Principles of State Policy – Its importance and implementation

UNIT-IV

Parliamentary Form of Government in India – Powers and Functions-The President of India - Status and Powers -The historical perspectives of the constitutional amendments in India-Judiciary system - Powers and Functions

UNIT-V

Local Self-Government – Constitutional Scheme in India- Election Commission: Role and Functions

TEXT BOOKS

1. Government of India Ministry of Law and Justice (Legislative Department),*The Constitution of India, 1950 (Bare Act,)* Government Publication, 2015
2. Dr. S. N. Busi, *Dr. B. R. Ambedkar framing of Indian Constitution*, 1st Edition, Government Publication, 2015

REFERENCES

1. M. P.Jain, *Indian Constitution Law*, Lexis Nexis 7th Edn., 2014
2. D.D. Basu, *Introduction to the Constitution of India*, Lexis Nexis,2015
3. P.M.Bakshi, *Constitution of India*, Universal Law Publishing,15th Edition,2018

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(19ME0345) BASIC ELECTRICAL & MECHANICAL ENGINEERING

COURSE OBJECTIVES

Objective of this course is to

1. *Know about Basics of Electrical Engineering*
2. *State the principles of DC motors and its classifications*
3. *Impart the aspects of the various manufacturing processes*
4. *Understand the basic fundamentals of mechanical engineering*
5. *Study the basics of automobiles, Energy conversion devices, R&AC*

COURSE OUTCOMES (COs)

Upon completion of this course, the students will be able to

1. *State various laws in Electrical Engineering and explain the operation of networks*
2. *Recognize the importance of different network theorems and explicate its applications in two port networks*
3. *Interpret the principle operation of DC motors and derive an EMF equation for the transformers*
4. *Classify various casting and metal joining processes in the manufacturing processes*
5. *Distinguish the types of machines in the manufacturing and elucidate the machining operations*
6. *Categorize the automobile engines and refrigeration & Air-conditioning systems*

PART A

UNIT – I

INTRODUCTION TO ELECTRICAL ENGINEERING: Ohm‘s Law, Basic Circuit Components, Kirchhoff‘s Laws, Types of Sources, Resistive Networks, Inductive Networks, Capacitive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor

UNIT – II

NETWORK THEOREMS & TWO PORT NETWORKS: Network Theorems- Thevenin‘s, Norton‘s, Maximum Power Transfer, Reciprocity and Superposition Theorems for DC Excitations

TWO PORT NETWORKS: Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations

UNIT – III

DC MOTORS and TRANSFORMERS

DC MOTORS: Principle of Operation of DC Motors, Types of DC Motors, Torque Equation, Losses and Efficiency Calculation in DC Motor. - Applications

TRANSFORMERS: Principles of Operation, EMF equation, Losses and Efficiency, Regulation of Transformer

PART B

UNIT – IV

CASTING & METAL JOINING PROCESSES:

TYPES OF CASTING PROCESSES - Permanent mould casting - Centrifugal casting - Investment casting

METAL JOINING PROCESSES – Principle of soldering, brazing and adhesive bonding - Position of welding, Classification of welding - Arc welding - Gas welding - Applications.

UNIT – V

MACHINE TOOLS: Introduction – Lathe, Shaping, Slotting, Planning, Drilling, Boring and Milling machines Principle of working. CNC Machining, classification and fundamentals of operation & Introduction to programming.

UNIT – VI

BASICS OF AUTOMOBILE ENGINEERING: Layout of automobiles – Components of four wheeler automobile, Rear wheel drive, Front wheel drive, Calcifications of automobiles.

REFRIGERATION & AIR CONDITIONING: Introduction to Refrigeration & Air conditioning –Classifications of Refrigeration systems-Vapour compression and Vapour absorption systems – Types of Air conditioning systems.

TEXT BOOKS

1. M.S.Naidu and S. Kamakshiah, *Basic Electrical Engineering*, TMH Publishers, 2007
2. D.P.Kothari & I.J. Nagrath, *Theory and Problems of Basic Electrical Engineering*, PHI, 2008
3. R. K. Jain and S. C. Gupta, *Production Technology*, Khanna Publishers, 16th Edition, 2001
4. R.K.Rajput, *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2010

REFERENCES

1. T.Thyagarajan, *Fundamentals of Electrical Electronics Engineering*, SCITECH Publications, 5th Edition, 2007
2. D.P. Kothari & I.J.Nagrath, *Theory and Problems of Basic Electrical Engineering*, PHI, 2012
3. Kirpal Singh, *Automobile Engineering*, Standard Publishers, 21st Edition, 2012
4. Roy J. Dossat, *Principles of Refrigeration*, Pearson Education Asia, 4th Edition, 2009

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II B.Tech – I Sem.

L	T	P	C
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(19CE0103) STRENGTH OF MATERIALS - II

COURSE OBJECTIVES

The objectives of this course

1. *To understand the behaviour of thin cylinders and thick cylinders under internal and external fluid pressure*
2. *To understand the direct and bending stress in beams*
3. *Analyze circular shafts subjected to torsion*
4. *Analyze statically inseminate beams such as fixed and continues*

COURSE OUTCOMES (COs)

The student will be able to

1. *Determine different stresses developed in thin and thick cylinders*
2. *Analyze members subjected to torsion, combined torsion and bending moment and apply the torsion theory for the analysis of springs*
3. *Determine the effect of direct and bending stress in beams and apply this principal to dams, chimneys and retaining walls*
4. *Describe various theories of failures*
5. *Analyze the fixed beams and continuous beams*
6. *Analyze curved beams in plan*

UNIT – I

Thin Cylinders: Thin cylindrical shells, Longitudinal and circumferential stresses; Hoop, Longitudinal and volumetric strains; Changes in dimensions of thin cylinders.

Thick Cylinders: Lame's theory, Distribution of hoop and radial stresses across thickness, Design of thick cylinders, Compound cylinders, Difference of radii for shrinkage

UNIT – II

Direct and Bending Stress: Stresses under the combined action of direct loading and bending moment - Core of a section – Determination of stresses in the case of chimneys, retaining walls and dams – Conditions for stability – Stresses due to direct loading and bending moment about both axes

Theories of Failures: Various theories of failures like Maximum Principal stress theory – Maximum principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory

UNIT – III

Torsion of Circular Shaft and Springs: Theory of pure torsion - Derivation of Torsion formula for circular shaft- Torsional theory applied to circular shafts – Polar section modulus – Power transmission through shafts – Combined bending and torsion–Close and open coiled helical springs under axial loads and axial twist – Carriage spring

UNIT – IV

Analysis of Fixed Beams: Fixed Beams with UDL, Point Loads, Uniformly Varying Load, Couple - Shear Force and Bending Moment Diagrams - Deflections

Analysis of Continuous Beams: Clapeyron's Theorem of Three Moments – Derivation of Theorem – Application to Continuous Beams with Point Load, Eccentric Load, Uniformly Distributed Load and Couple –Shear Force and Bending Moment Diagrams

UNIT – V

Beams Curved in Plan: Forced developed at a section in a curved beam - Torsion factor - Analysis of beams curved in plan - Circular arc cantilever - Semi-circular beams fixed at two ends and subjected to central concentrated load - Semi-circular beam subject to UDL and simply supported by three columns spaced equally - Circular ring beams

TEXT BOOKS

1. Dr. R. K. Bansal, *A Textbook of Strength of Materials*, Laxmi Publications, 5th Edition, 2012
2. Bhavikatti. S.S, Structural *Analysis – Vol. 1 & Vol. 2*, Vikas Publishing Pvt Ltd., New Delhi, 2008

REFERENCES

1. Er. K. Rajput, *Strength of Materials (Mechanics of Solids)*, S.Chand Publishing, 6thEdition.
2 Dr. B. C. Punmia, Er. Ashok Kr. Jain, Dr. Arun Kumar Jain, *Mechanics of Materials*, Revised Laxmi Publications, 2016
3. V.N.Vazrani M.M. Ratwani & S.K.Duggal, Analysis of Structures- Vol.2, Khanna Publications, 16th Edition, 2009
4.Vaidyanadhan, R and Perumal, P, Comprehensive Structural Analysis– Vol. 1 & Vol. 2, Laxmi Publications Pvt. Ltd, New Delhi, 2003

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II B.Tech – I Sem.

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(19CE0104) SURVEYING & GEOMATICS

COURSE OBJECTIVES

The objectives of this course

1. *To train the students on the basic principles of surveying for the measurement of distances and areas*
2. *To measure the bearing of a line with prismatic compass and horizontal angles between the lines and vertical angles of elevated or depressed objects by transit theodolite*
3. *To apply for horizontal and vertical distance computation by tacheometry survey and EDM instrument*
4. *To set out the different types of curves in the field*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Classify and explain the surveying and its principles*
2. *Use the principles of Chain and Compass survey to construct traverse and correct the error of chain and tape while measuring distances*
3. *Prepare LS & CS profiles and counter map using levelling instrument*
4. *To measure horizontal and vertical angles using theodolite and tacheometric surveying and their by compute the horizontal and vertical distances*
5. To c*alculate, design and set various types of horizontal curves*
6. *To describe the working principles of EDM and total station*

UNIT – I

Principles of Surveying: Surveying–Definition-Primary divisions – Classification - Principles of surveying - Scales used for Maps and Plans - Duties of a Surveyor - Errors: Accuracy and Precision - Sources and types of errors

Chain & Compass Surveying: Chain and its accessories- Corrections for tape- Obstacles in Chaining - Compass Surveying - Units of angle measurement - Meridians, Azimuths, Bearings - Magnetic declination and dip - Prismatic and Surveyor compass – Temporary adjustment - Local attraction and corrections to angles and bearing of lines

UNIT – II

Levelling: Basic definitions - Methods of leveling - Leveling instruments: Dumpy level- Leveling staff - Temporary adjustments of dumpy level - Level Field Book – Booking and reduced levels – Methods – Simple leveling - Compound leveling - Check leveling- Reciprocal leveling - Profile leveling - Cross sectioning - Curvature and Refraction - Difficulties in leveling - Errors in leveling

Contouring: General - Contour Interval - Characteristics of contours - Methods of locating contours - Direct and indirect methods - Interpolation of contours - Contour Gradient - Uses of contour maps

UNIT – III

Theodolite: Basic definitions - Fundamental lines and desired relations – Types of Theodolite-Temporary adjustments - Measurement of a horizontal angle - Repetition and Reiteration methods - Measurement of Vertical angle - Sources of errors in Theodolite survey – Single and Double plane method

Tacheometric Surveying: Instrument- Different systems of Tacheometric measurement - Determination of constants K and C – Inclined sight with staff vertical - Inclined sight with staff normal to the line of sight - Movable hair method – Tangential method

UNIT – IV

Curves: Simple curves – Definitions and notations - Designation of a curve - Elements of simple curves - Methods of setting out simple curves - Rankine's method-Two theodolite method-Compound curves – Elements of compound curve - Reverse curve – Elements of Reverse curve - Relationship between various elements

UNIT – V

Electronic Distance Measurements: Introduction – Basic concepts of Electromagnetic waves - Basic definitions - Phase of the Wave, Units, and Types of waves - Measurement of transit time - Computing the distance from the phase differences - Modulation - EDM instruments - Electronic Theodolite

Total Station: Models, Fundamental measurements, Recording, Traversing, and Data retrieval - Global Positioning System

TEXT BOOKS

1. Punmia B.C, *Surveying Vol-I & II*, Laxmi Publications, New Delhi, 15th Edition, 2016
2. Arora K. R, *Surveying Vol-I*, Rajsons Publications Pvt. Ltd, 10th Edition, 2008

REFERENCES

1. Kanetkar. T.P. & S.V. Kulkarni, *Surveying and Levelling, Part I & II*, Puna Vidyarthi Girha, Prakashan, 23rd Edition, 2006
2. R. Subramanian, *Fundamentals of Surveying and Levelling*, Oxford University Press, India, 1st Edition, 2014
3. Basak N.N, *Surveying and Leveling*, Tata McGraw Hill Publishing Company Ltd, 2nd Edition, 2014

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(19CE0105) BUILDING MATERIALS & CONSTRUCTION

COURSE OBJECTIVES

The objectives of this course

1. To introduce conventional and modern construction materials
2. To import knowledge of building components
3. To import knowledge of construction practices.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Classify different engineering materials and its application in construction*
2. *Describe the manufacturing process of different construction materials*
3. *Discuss various engineering properties of materials and testing methods*
4. *Classify sub structure and super structure and describe various building components*
5. *Classify foundations and can recognize the importance of foundation*
6. *Explain the construction of masonry, building components and applying surface course and finishes*

UNIT I

Stones: Classification of rocks – Quarrying of stones: tools, methods, precautions – Uses of stones – Characteristics of good building stones

Bricks: Classification of bricks – Characteristics of good bricks – Ingredients of good brick earth – Harmful substances in brick earth – Manufacturing of bricks – Defects in bricks

Wood: Classification of trees – Classification of timber – Structure of timber – Characteristics of good timber – Seasoning of timber – Defects, diseases and decay of timber

UNIT II

Cement: Properties of cement – Composition of ordinary cement – Manufacturing of ordinary cement - field tests on cement – Laboratory tests on cement – Storage of cement

Concrete: Workability - Factors affecting workability - Measurement of workability by different tests - Setting times of concrete - Segregation & Bleeding - Mixing and vibration of concrete – Special concrete

Miscellaneous Materials: Pig iron – Cast iron – Steel – Glass – Asbestos – Gypsum – Rubber

UNIT III

Paints & Distempers: Composition of oil paint – Preparation of paint – Painting plastered surfaces – Painting wood surfaces – Painting metal surfaces – Defects – Distemper– White wash and color wash – Varnish

Highway Materials: Aggregates and Bitumen - Desirable Properties – Tests

UNIT IV

Foundation: Functions of foundation – Requirements of good foundation – Type of foundation – Foundation failures and Remedial measures

Masonry: Definition of terms used in masonry – Classification of Stone Masonry – English and Flemish Bonds in Brick Masonry – Defects in brick masonry – Comparison of brick and stone masonry

UNIT V

Lintels & Arches: Classification of lintels – Terms used in arches – Classification of arches

Plastering and Pointing: Types of mortars for plastering – Methods of plastering–Defects in plastering – Pointing

Stairs: Technical terms – Requirements of good stair – Classification of stairs

TEXTBOOKS

1. S.K.Duggal, *Building Materials*, New Age International Publishers, Fourth Revised Edition, 2008
2. B.C. Punmia, *Building Construction*, Laxmi Publications, 11th Edition

REFERENCES

1. Rangwala, *Engineering Materials*, Charotar Publishing House Pvt. Ltd, 42nd Edition
2. Dr.S.K. Sharma, *Building Construction*, S. Chand Publishers
3. Jagadish, Venkatarama Reddy and others, *Alternate Building Materials and Technology*, New Age Publications
4. S.K. Khanna& C.E.G. Justo, A.Veeraragavan, *Highway Engineering*, Nem Chand & Bros., Publishers, Revised 10th Edition

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II B.Tech – I Sem.

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(19EE0238) GENERATION OF ENERGY THROUGH WASTE

COURSE OBJECTIVES

The objectives of this course

1. *To understand different types of waste as fuel*
2. *To introduce Pyrolysis methods and conversion processes*
3. *To understand gasification methods for biomass*
4. *To learn concepts of biomass resources, combustion types and biogas plant technology*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Analyze agro based, forest residue and industrial waste conversion processes*
2. *Manufacture of Pyrolytic oils and gases*
3. *Manufacture of charcoal, yields and applications*
4. *Understand various types of gasifiers operation*
5. *Understand inclined and fluidized bed combustors operation*
6. *Understand types of biogas plants and biomass energy programme in India*

UNIT- I

Introduction to Energy from waste: Classification of waste as fuel –Agro based- Forest residue- Industrial waste- MSW- conversion devices- Incinerators- Gasifiers-Digestors

UNIT- II

Bio-mass Pyrolysis: Pyrolysis- Types- Slow-Fast- Manufacture of Charcoal- methods- yields and application. Manufacture of Pyrolytic oils and gases – yields and applications

UNIT- III

Biomass Gasification: Gasifiers- Fixed bed system- Downdraft and Updraft gasifiers- Fluidized bed gasifiers- construction and operation- Gasifier burner arrangement for thermal heating

UNIT- IV

Biomass Combustion: Biomass stoves- Types- Inclined combustors- Fluidized bed combustors- construction and operation of above biomass combustors

UNIT- V

Properties of Biogas: Biogas plant Technology and status – Biomass resources and their classification- Biomass conversion processes- thermo chemical conversion –Direct Combustion- Biomass gasification- Pyrolysis and liquefaction – bio-chemical conversion- anaerobic digestion- Types of biogas plants- applications-Biomass Energy Programme in India

TEXT BOOKS

1. Desai Ashok V, *Non-Conventional Energy*, Wiley Eastern Ltd, 1990
2. Khandelwal K.C. and Mahdi SS, *Biogas Technology ,A Practical Hand Book ,Vol I &II*, Tata Mc Graw Hill Publishing Co Ltd.,1983

REFERENCES

1. Challal D.S., *Food, Feed and Fuel from Biomass,* IBH Publishing Co Pvt Ltd.,1991
2. GD Roy, *Non-Conventional Energy Sources*, Khanna Publishers, 6th Edition
3. Khahid Rehman Hekeem, Mohammad Jawald., Umar Rashid, *Biomass & Bioenergy*, Springer International Publishing Ltd

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II B.Tech – I Sem.

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(19ME0349) FUNDAMENTALS OF MECHANICAL ENGINEERING

COURSE OBJECTIVES

Objective of this course is to

1. *Impart knowledge on Engineering materials, alloying and Heat treatment.*
2. *Familiarize student with IC Engines and Air compressors.*
3. *Make the student learn about a Refrigeration& Air conditioning systems and working of various Power plants*
4. *Enable the student to know about Modern Machining processes.*
5. *Make the student understand about Robotics and computer aided drafting, manufacturing, quality control.*

COURSE OUTCOMES (COs)

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

1. *List the types of Engineering materials and also describe alloying, Heat treatment Processes.*
2. *Recognize the importance of IC Engines in automobiles and the classification of air compressors*
3. *Distinguish various types of air conditioning systems for house and Industrial applications*
4. *Explicate the working of various Power plants like nuclear, Hydro & thermal power plants*
5. *Classify various types' modern machining processes and determine the best suitable process to machine a component.*
6. *Apply the working principles of CAD, CAM and CIM in the operation of Robotic manufacturing and quality control systems*

UNIT-I

Engineering Materials: Classification of Materials - Engineering properties of Materials, Necessity of alloying – Applications

Heat Treatment of Alloys: Annealing - Normalizing – Hardening- Tempering- Surface hardening methods

UNIT-II

I.C. Engines- Definition of Engine and Heat Engine, I.C Engine Classification –Parts of an IC Engine, Working of Two Stroke & Four Stroke Engines.

Air Compressors: Reciprocating & Rotary Compressor - Types –Working.

UNIT-III

Refrigeration: Introduction to Refrigeration- Classifications of Refrigeration systems-Vapour compression and Vapour absorption systems.

Air conditioning: Introduction to Air conditioning - Classifications of Air conditioning systems-window air conditioning system, split conditioning system, Central air conditioning system.

UNIT-IV

Modern Machining: Traditional machining versus modern machining methods- Need of modern machining process – Classifications - Process selection, Materials, and applications, Ultrasonic Machining, Water Jet Machining, Abrasive Water Jet Machining.

UNIT-V

CAD/CAM: Role of computers in manufacturing– CAD, CAM, CIM, Computer aided quality control- Inspection Methods-Advantages & Applications.

Robotics: Robot-Necessity of Robot in manufacturing environment-Classification-Principle components-Degrees of freedom-End effectors-Advantages.

TEXT BOOKS

1. R. K. Rajput, *Engineering Materials and Metallurgy*, S. Chand Publishers, 3rd Edition, 2008
2. C.P. Arora & Domkundwar, *Refrigeration and Air Conditioning*, McGraw Hill, 3rd Edition, 2010
3. M.P. Groover, *Industrial Robotics*, Tata McGraw Hill Publications, 2017

REFERENCES

1. Dr. Kodgire V.D, *A Text Book of Material Science and Metallurgy for Engineers*, Everest Publishing House, 12th Edition, 2007
2. Hassan Abdel, *Advanced Machining Processes*, McGraw-Hill, 2005
3. A Zimmers & P.Groover, *CAD/CAM*, PE Publishing, 5th Edition, 2008
4. R.K.Rajput, *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2010

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II B.Tech – I Sem.

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(19EC0448) INTRODUCTION TO COMMUNICATION SYSTEMS

COURSE OBJECTIVES

The objectives of this course

1. *To study the fundamental concepts of the analog communication system*
2. *To analyse various analog modulation and demodulation techniques*
3. *The students to be able to understand, analyse, and design fundamental digital communication systems*
4. *The course focuses on developing digital communication systems*
5. *To understand basics of various Communication*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Demonstrate knowledge in elements of Analog Digital and Wireless Communication Systems*
2. *Analyse the analog modulated and demodulated systems*
3. *Understand the principle involved in different modulation techniques*
4. *Understand the basic principles of baseband and pass band digital modulation schemes*
5. *Analyse probability of error performance of digital systems and are able to design digital communications*
6. *Implement various Keying and accessing techniques in real time wireless communication systems*

UNIT- I

Communication: Introduction, Elements of communication systems, wired Communications systems, Wireless Communications systems, Modulation, Need of modulation, modulation Methods, difference between Analog and Digital communication

Amplitude Modulation & Demodulation: DSB-FC(AM)modulation& its demodulation, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Single sideband (SSB) transmission, Comparison of various amplitude modulation techniques

UNIT- II

Angle Modulation & Demodulation: Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Phase modulation (PM)

UNIT- III

Noise in Communication Systems: Types of noise, Noise figure.

Analog pulse modulation schemes: Pulse amplitude modulation (PAM), Pulse Width modulation (PWM) and Pulse Position modulations (PPM)

UNIT IV

Digital Communication: Introduction-Elements of digital communication systems, sampling process, quantization, quantization noise

Source Coding Systems: Pulse-Code Modulation (PCM), Differential PCM (DPCM), Delta modulation (DM), Comparison of PCM, DPCM, DM.

Pass band Data Transmission: Introduction, Amplitude shift keying(ASK), binary phase shift keying (BPSK), Binary Frequency shift keying (BFSK) Comparison of ASK, PSK, FSK

UNIT V

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communication Systems, Examples of wireless communication Systems – Paging Systems, Cordless Telephone, Cellular Telephone Systems, Overview of generation of cellular systems.

Multiple Access Techniques for Wireless Communications: Introduction to Multiple Access, FDMA, TDMA, CDMA, SDMA.

TEXT BOOKS

1. Simon Haykin, *Communication Systems*, Wiley India Edition, 4th Edition, 2011
2. B.P. Lathi, & Zhi Ding, *Modern Digital & Analog Communication Systems*, Oxford University Press, International 4th edition, 2010

REFERENCES

1. Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2005
2. Bruce Carlson, & Paul B. Crilly, *Communication Systems – An Introduction to Signals & Noise in Electrical Communication*, McGraw-Hill, 5th Edition, 2010
3. Bernard Sklar, *Digital Communications*, Prentice-Hall PTR, 2nd edition, 2001
4. Herbert Taub & Donald L Schilling, *Principles of Communication Systems*, Tata McGraw-Hill, 3rd Edition, 2009
5. J.G.Proakis, M Salehi, Gerhard Bauch, Modern *Communication Systems Using MATLAB*, CENGAGE, 3rd Edition, 2013

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(19CS0550) RELATIONAL DATABASE MANAGEMENT SYSTEM

COURSE OBJECTIVES

The objectives of this course

1. *Explain different issues involved in the design and implementation of a database system*
2. *Explain physical and logical database designs, database modeling, relational, hierarchical, and network models*
3. *Introduce data manipulation language to, update, query and manage a database*
4. *Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling and designing a DBMS*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Develop relational algebra expressions for queries and optimize them*
2. *Design the databases using E_R method for a given specification of requirements*
3. *Apply Normalization techniques on given database*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system*
5. *Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling*
6. *Understand Physical Storage Media and RAID concepts*

UNIT- I

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Data Abstraction, Data Independence, Data Models, Database Languages, Database Architecture, Database Users and Administrators

UNIT-II

Introduction to Data base design: ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets

Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins

UNIT-III

Form of Basic SQL Query- Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values

UNIT-IV

Introduction to Schema Refinement- Problems Caused by redundancy, Normal Forms - FIRST, SECOND, THIRD Normal forms

Properties of Decompositions: Lossless join Decomposition, Dependency preserving Decomposition - FOURTH Normal Form, FIFTH Normal form

UNIT- V

Recoverability: System Recovery – Media Recovery –Two Phase locking – Deadlock-Detection, Recovery and Prevention

Physical Storage and Database Concepts: Overview of Physical Storage Media and RAID

TEXT BOOK

1. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, *Database System Concepts*, Sixth Edition, Tata McGraw Hill, 2011

REFERENCES

1. Raghurama Krishnan, Johannes Gehrke, *Database Management Systems*, McGraw Hill Education, 3rd Edition, 2003
2. J. D. Ullman, *Principles of Database and Knowledge–Base Systems, Vol 1*, Computer Science Press
3. Peter Rob & Carlos Coronel , *Database Systems Concepts*, Cengage Learning, 2008
4. C.J. Date , *Introduction to Database Systems*, Pearson Education
5. G.K. Gupta, *Database Management Systems*, McGraw Hill Education

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(19HS0813) MANAGEMENT SCIENCE

COURSE OBJECTIVES

The objectives of this course

1. *To understand the basic concepts, principles and processes of management*
2. *To help the students gain an understanding of the functions, responsibilities of managers*
3. *To get an awareness about the latest developments and contemporary issues in the field of management*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Utilize appropriate theoretical frameworks to real life business and managerial problems*
2. *Identify appropriate operational risks and develop appropriate responses to them*
3. *Apply human resource principles to recruit, select and manage employees to achieve organizational goals*
4. *Enact strategy, including contingent plans for the effective management of the organization*
5. *Identify, plan, and implement the projects and evaluate the performance of the projects*
6. *Analyze effective application of latest developments to diagnose and solve organizational problems*

UNIT – I

Introduction to Management: Management-Concept and meaning-Nature-Functions-Management as a science and art and both - Schools of management thought-Taylor‘s scientific theory-Henry Fayol‘s principles- Weber‘s Ideal Bureaucracy - Eltan Mayo‘s Human relations-Systems theory- Situational or Contingency theory-Social responsibilities of management.

Organizational Structure and Design: Features of organizational structure-work specialization - Departmentation- Span of control-Centralization and Decentralization. **Organizational Designs:** Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of organization.

UNIT – II

Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study- Statistical Quality Control**:** *C* chart, *P* chart, (simple Problems) Deming’s contribution to quality

Material Management: Objectives-Inventory- Functions, types, inventory classification techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management

Marketing Management: Concept- Meaning - Nature-Functions of Marketing- Marketing Mix-Channels of distribution -Advertisement and sales promotion- Marketing Strategies based on Product Life Cycle

UNIT – III

Human Resources Management (HRM): HRM- Definition and meaning – nature-Managerial and Operative functions-Evolution of HRM-Human Resource Planning(HRP)-Employee Recruitment-sources of recruitment- employee selection- process and tests in employee selection- Employee training and development-On- the- job and Off- the- job training methods-Performance Appraisal systems- Concept - Methods of Performance Appraisal-Placement-Employee Induction-Wage and Salary Administration-Objectives-Essentials of Wage and Salary Administration-Job Analysis- Process -Job Evaluation-Employee Grievances-techniques of handling Grievances.

UNIT – IV

Strategic Management: Definition& meaning-Setting of Vision- Mission- Goals- Corporate Planning Process- Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis.

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

UNIT – V

Contemporary Issues In Management: The concept of MIS- Materials Requirement Planning (MRP) -Just-In-Time (JIT) System -Total Quality Management (TQM)- Six Sigma Concept-Supply Chain Management-Enterprise Resource Planning (ERP)- Performance Management-Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management

TEXT BOOKS

1. A.R Aryasri, *Management Science*, TMH,2013
2. Stoner, Freeman, Gilbert, *Management*, Pearson Education, New Delhi, 2012

REFERENCES

1. Kotler Philip & Keller Kevin Lane, *Marketing Management*, PHI, 2013
2. Koontz & Weihrich, *Essentials of Management*, 6/e, TMH, 2005
3. Thomas N.Duening & John M.Ivancevich, *Management Principles and Guidelines*, Biztantra
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004
5. Memoria & S.V.Gauker, *Personnel Management*, Himalaya, 25/e, 2005

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(19CE0106) STRENGTH OF MATERIALS LAB

COURSE OBJECTIVES

The objectives of this course

1. *Able to conduct test on engineering materials*
2. *To determine the elastic properties such as compression, tension, torsion and modulus of elasticity*

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. *Conduct tension test on mild steel bar and plot stress strain curve*
2. *Conduct compression test on wood, brick and concrete and can calculate their compression test*
3. *Conduct impact test on metal specimens*
4. *Find hardness of different materials*
5. *Determine modulus of elasticity of given material of beam by studying deflection for different loads*
6. *Determine tensile and torsional strength of mild steel bars and find stiffness of a helical spring*

LIST OF EXPERIMENTS

1. Bending test on simple support beam by using central load and eccentric load
2. Water absorption and Compression test on brick
3. Compression test on wood
4. Compression test on concrete
5. Shear test on wood
6. Impact test on metal specimen (Izod and Charpy)
7. Compression test on helical spring
8. Tension test on mild steel bar
9. Torsion test on mild steel bar
10. Continuous beam – deflection test
11. Hardness test on metals (Rockwell and Brinell Hardness Number Tests)
12. Verification of Maxwell's Reciprocal theorem on beams

Any ten experiments may be conducted

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(19CE0107) SURVEYING LABORATORY

COURSE OBJECTIVES

The objectives of this course is

1. *To train the students in plotting of land by chain, tape and plane table survey*
2. *To train the students in determining the distance between two inaccessible points by prismatic compass and plane table and theodolite methods*
3. *To train the students in plotting of maps by conducting leveling survey, tacheometric methods and total station*

COURSE OUTCOMES (COs)

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

1. *Calculate the area of given polygon by chain and plane table surveying*
2. *Determine the elevation of various points using leveling instruments*
3. *Compute the angles, distance and height by compass, theodolite, tacheometry and total station*
4. *Setting out the curve by theodolite and tacheometry*
5. *Describe the concept of foundation marking*
6. *Use total station for carrying basic operations*

LIST OF EXPERIMENTS

1. Determination of area of polygon by chain and cross staff survey.
2. Measurement of bearings of sides of traverse with prismatic compass and computation of correct included angle.
3. Determination of area of polygon by Plane table surveying- Radiation method
4. Measurement of distance between two inaccessible points by Plane table surveying – Intersection method
5. Determination of elevation of various points with dumpy level by collimation method (Fly Leveling)
6. Determination of elevation of various points with level by rise & fall method (Check Leveling)
7. Measurement of horizontal angles by method of repetition and reiteration.
8. Trigonometric leveling – Measurement of heights and distances (Single plane method)
9. Heights and distance measurement using Principles of tacheometric surveying
10. Setting out a simple curve by Rankine's method
11. Setting out works for a single bedroom residential buildings (Foundation marking)
12. Determination of area using digital Planimeter
13. Determination of area using total station

Any ten experiments may be conducted

REFERENCES

1. Roy S.K., *Fundamentals of Surveying*, Prentice Hall of India, 2nd Edition, 2004
2. Arora K.R., *Surveying, Vol I & II*, Standard Book house, 10th Edition, 2008

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(19CE0108) COMPUTER AIDED DRAWING LAB

COURSE OBJECTIVES

The objectives of this course is

1. To give introduction of Computer Aided Drafting (CAD)
2. *Drawing Basic drawing fundamentals in various civil engineering applications*
3. *To draft the plan, elevation and sectional views of buildings*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Discuss the CAD, its advantages and applications*
2. *Describe GUI of Auto CAD and can work with basic operation of file management*
3. *Work with annotation facilities in Auto CAD*
4. *Draw simple geometric shapes using commands*
5. *Draw complex two-dimensional geometric figures in Auto CAD*
6. *Develop complete plan of a residential building in ready to print form*

EXERCISES

1.0 Introduction to Computer Aided Drafting (CAD):

1.1 About Auto CAD
1.2 Computer graphics
1.3 Definition of CAD
1.4 Applications of CAD
1.5 Advantages of CAD
1.6 Introduction to Auto CAD as drafting package
1.7 Hardware requirements

2.0 Practices on Auto CAD:

2.1 Graphical User Interface
2.2 Study of drawing editor screen
2.3 List out methods to access Auto CAD commands
2.4 Practice of setting up of drawing area using utility commands & using setting commands
2.5 Practice of File Management New, Open, Save, Save As, Export, Print, Publish, Drawing utilities, Units
2.6 Practice of Geometrical commands line, Polyline, Circle, Erase, Oops, Snap, Arc, Ellipse, Polygon, Spline, Ellipse, Rectangle, and Donut
2.7 Draw the given geometrical figures using draw commands
2.8 Practice of Modify Commands Move, Copy, Array, Break, Mirror, Offset, Scale, Rotate, Trim, Extend, Stretch, Solid, Fillet, Chamfer, Explode
2.9 Draw the given figures using draw & Modifying commands
2.10 Practice of Object Properties Colour, Line type, Line weight

2.11 Practice of view commands Zoom, Pan
2.12 Practice of Drafting Settings
2.13 Practice of Hatch, Gradient commands
2.14 Practice of Block &insert commands

3.0 Annotations:

3.1 Practice of Text, Text Justifications, Multi Line text, Text style, Scale text, Spell
3.2 Practice on Leader, Multi Leader and Leader settings
3.3 Practices on Table
3.4Practice on Dimensioning, DimLinear, Dimradius, DimAligned, DimDiameter, Dimcenter, Dim Angular, DimBaseline, Dimcontinue, Dimordinate, Dimensional settings
3.5 Utilities, Distance, Radius, Angle, Area, Volume
3.6 Layer properties, make object Layer current, Match, previous, Isolate and Un- Isolate, Freeze, Off, turn all layers on, thaw all layers, Lock, Unlock, Change to current Layer, Copy objects to new Layer, Layer Walk, Isolate to current View port, Merge, Delete, Locked Layer fading
3.7 Practice Plans using Layers

4.0 Geometric Constructions:

4.1 Practice on Point, DDP type, Divide, Measure
4.2 Divide a given line into desired number of equal parts internally
4.3 Draw tangent lines and arcs
4.4 Construct a hexagon from the given data
4.5 Construct ellipse, parabola, hyperbola, cycloid and helix
4.6 Using CAD software draws & prints the following drawings
4.7 Draw conventional signs as per I.S. Standards, Symbols used in civil engineering drawing
4.8 Draw the important joinery components of the building like elevation of fully paneled double leaf door, elevation of partly glazed and partly paneled window

5.0 Residential Building:

5.1 Plan, Elevation, Section of single roomed building
5.2 Single storied bearing type residential building
5.2.1 One Bedroom House
5.2.2 Two Bedroom House
5.3 Single storied framed structure type residential building
5.3.1 One Bedroom House
5.3.2 Two Bedroom House
5.4 Drawing to be submitted for approval to corporate or municipality showing required details in one sheet such as
5.4.1 Plan-Showing Dimensions of all rooms
5.4.2 Section-Showing specifications and Typical Foundation Details
5.4.3 Elevation
5.4.4 Site Plan- Showing Boundaries of site and plinth Area, car parking, passages and location of the septic tank
5.4.5 Key plan- Showing the location of the building

5.4.6 Title block- Showing Signature of owner & Licensed surveyor's

TEXT BOOKS

1. M. N. Sesha Praksh & Dr. G. S. Servesh, *Computer Aided Design Laboratory,* Laxmi Publications
2. P. J. Sha, *Engineering Graphics,* S. Chand & Co

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(19HS0805) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES

The objectives of this course is

1. *Identify environmental problems arising due to engineering and technological activities and the science behind those problems*
2. *To identify the importance of interlinking of food chains*
3. *Learn about various attributes of pollution management and waste management practices*

COURSE OUTCOMES (COs)

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

1. *Recognize the physical, chemical and biological components of the earth's systems and show how they function.*
2. *Characterize and analyse human impacts on the environment.*
3. *Integrate facts, concepts and methods from multiple disciplines and apply to environmental Problems*
4. *Create informed opinions about how to interact with the environment on both a personal and a social level*
5. *Perform independent research on human interactions with the environment*
6. *Recognize the ecological basis for regional and global environmental issues*

UNIT – I

Introduction: Definition, Scope and Importance of environmental science, Need for Public Awareness

Natural Resources: Forest resources: Use and over-exploitation, deforestation, Mining, dams and their effects on forests and tribal people. **Water resources:** Use and over utilization of surface and ground water Floods, drought, conflicts over water, dams' benefits and problems. **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral. **Energy resources:** Renewable and Non- Renewable sources of energy. Solar energy, Hydro electrical energy, Wind energy, Nuclear energy

UNIT-II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem - Producers, Consumers and Decomposers - Biogeochemical cycles, Ecological succession, energy flow in an ecosystem, Food chains, food webs and ecological pyramids - Types of ecosystems (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem.

UNIT-III

Biodiversity and its Conservation: Introduction, Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, India as a Mega diversity Nation, Hot spots of

biodiversity, Value of biodiversity, Threats to biodiversity, Endemic, Endangered and Extinct species of India, In-Situ and Ex-situ conservation of biodiversity

UNIT-IV

Environmental Pollution and Global Environmental Issues: Natural Disasters: Droughts, Floods, Cyclone, Landslides, and Earthquake

Pollution episodes: Air Pollution, Water Pollution, Land Pollution, Noise Pollution, Automobile, Nuclear pollution. Global warming, Acid rain, Ozone layer depletion and controlling measures-Global Environmental Issues: Population Growth, Urbanizations, Land Management, Water and Waste Water Management. Climate change and impacts on human environment

Solid Waste Management: causes, effects and control measures of Municipal solid wastes. E-waste and management, Role of an individual in prevention of pollution

UNIT-V

Environmental Legislations, Laws, Policies for Sustainable Development: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water Act, Wildlife protection Act, Forest conservation Act -Municipal Solid Waste management International conventions/Protocols Earth summit, Kyoto protocol and Montreal Protocol - Unsustainable to sustainable development, Role of NGO's for Sustainable development - Role of IT in Environment, GIS methods for sustainable development

Field work- visit to a local area to document environmental assets, river, forest, grassland/hill, mountain and polluted sites (urban/rural/industrial/Agriculture) study simple ecosystems

TEXT BOOKS

1. A.Kaushik and C.P.Kaushik, *Environmental Sciences,* New Age International Publishers, *5th edition*, 2015
2. M.Anji Reddy, *Text Book of Environmental Science and Technology*, BS Publications, 2016

REFERENCES

1. Anil Kumar and Arnab Kumar De, *Environmental Studies*, New Age International Publishers, New Delhi, 3rd Edition 2015
2. R.K. Trivedi, *"Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards"*, Vol.I and II, Enviro Media, 2016
3. Rajagopalan.R, *"Environmental Studies-From Crisis to Cure"*, Oxford University Press, 2005

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(19HS0833) NUMERICAL METHODS, PROBABILITY & STATISTICS

COURSE OBJECTIVES

The objectives of this course

1. *To introduce the tools of differentiation and integration of functions of numerical methods that is used in various techniques dealing engineering problems*
2. *To develop the essential tool of Probability & Statistics in a comprehensive manner*
3. *To develop the skill pertinent to the practice of the mathematical concepts including the Student abilities to formulate and modeling the problems, to think creatively and to Synthesize information*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *To develop the mathematical skills of the students in the areas of numerical methods*
2. *Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations*
3. *Work out numerical differentiation and integration whenever and wherever routine methods are not applicable*
4. *A good understanding of the laws of probability axioms and rules*
5. *Understanding of moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables*
6. *Calculate and interpret the correlation and Regression between two variables*

UNIT I

Solution of algebraic and transcendental equations: Solution of polynomial and transcendental equations: Bisection method, Newton-Raphson method and Regula-Falsi method

Interpolation: Finite differences, Interpolation using Newton's forward and backward difference formulae

UNIT- II

Numerical solution of Ordinary differential equations: Taylor's series, Euler and Runge-Kutta method of fourth order for solving first and second order equations

Numerical integration: Trapezoidal rule, Simpson's 1/3rd and 3/8 rules

UNIT III

Basic Statistics: Measures of Central tendency, Moments, skewness and Kurtosis

Basic Probability: Probability spaces, Addition theorem, conditional probability, independence, Multiplication theorem, Baye's theorem

UNIT IV

Random variables: Discrete and Continuous random variables- distribution functions, densities and their properties. Expectation of Discrete and Continuous Random Variables

UNIT V

Probability Distributions and Correlation: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions. Correlation and regression – Rank correlation

TEXT BOOKS

1. Grewal B S, *Higher Engineering Mathematics*, Khanna Publishers, 44thedition, 2017
2. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Probability & Statistics*, S.Chand publications, 2018

REFERENCES

1. Rukmangadachari. E & Keshava Reddy E, *Engineering Mathematics*, Volume-III, Pearson Publishers, 2010
2. Ramana B. V, *Higher Engineering Mathematics*, McGraw Hill Education, 2010
3. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics-III,* S.Chand publication, 2014
4. Gupta S.P, *Statistical methods*, S.Chand publications, 2011

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(19CE0109) FLUID MECHANICS

COURSE OBJECTIVES

The objectives of this course is

1. *To understand the basic concepts of Fluid properties and fluid statics*
2. *To understand the applications of fluid kinematics and dynamics*
3. *To understand the behavior of pipe flow and losses in pipe flow*
4. *To understand the concepts of flow measurements and boundary layer flows*

COURSE OUTCOMES (COs)

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

1. *State Newton's Law of Viscosity, discuss and calculate fluid properties*
2. *Define Pascal's Law and apply it for measuring pressure devices*
3. *Classify various fluid flows and derive continuity equation*
4. *Deriving Euler's, Bernoulli's, Impulse Momentum Equation and applying them for fluid flow problems*
5. *Derive Darcy Weisbach equation and apply it pipe flow problems*
6. *Describe Laminar and Turbulent flow characteristics*

UNIT-I

Fluid Properties: Dimensions and units - Definition of a fluid – Types of fluids – Ideal fluids, Real fluids -Physical properties of fluids- Density, Specific weight, Specific volume, Specific gravity, Compressibility, viscosity- Newton's Law of Viscosity, Surface tension capillarity and , Vapour pressure

Fluid Statics: Pascal's law – Pressure variation in a static fluid – Atmospheric, gauge and absolute pressures – Measurement of pressure – Piezometer, U–tube and inverted U–tube manometers and Bourdon's pressure gauge - buoyant force - hydrostatic forces on plane and curved surfaces -center of pressure

UNIT-II

Fluid Kinematics: Types of flow – Streamline – Streak line – Path line – Stream tube – Control volume – Continuity equation in one and three dimensional forms – Stream function and velocity potential function – Flow net – Acceleration of a fluid particle – Local and convective accelerations – Tangential and normal accelerations

UNIT-III

Fluid Dynamics: Euler's equation of motion along a streamline – Bernoulli's energy equation – Energy correction factor – Impulse momentum equation – Momentum correction factor – Force on a bend – Energy gradient line – Hydraulic gradient line – Analysis of free liquid jets – Forced vortex and free vortex

Flow Measurement: Velocity measurement by Pitot tube and Pitot static tube – Discharge measurement by Venturimeter and orifice meter - Orifices and mouthpieces – Flow over rectangular, triangular, trapezoidal and stepped notches - Broad crested weirs

UNIT-IV

Analysis of Pipe Flow: Loss of head through pipes - Darcy Weisbach equation - minor losses in pipe flow – Pipes in Series – Pipes in Parallel - Equivalent Pipes – Siphon - Analysis of Pipe Networks ; Hardy Cross Method

UNIT-V

Laminar Flow: Dimensionless numbers -Reynolds Experiment - Laminar Flow Through: Circular Pipes – Hagen Poiseuille equation - – Laminar flow through parallel plates.

Turbulent Flow: Definition - Causes of Turbulence - Velocity Distribution in Turbulent Flow in Pipes- Resistance of Smooth and Rough Pipes

TEXT BOOKS

1. Dr. P.N. Modi & Dr. S.M. Seth, *Hydraulics and Fluid Mechanics Including Hydraulics Machines (A-4-Size),*Standard Book House ,21th Edition,2018
2. *Er.R.K.Rajput , A Textbook of Fluid Mechanics and Hydraulic Machines,* S.Chand Publications, 3rd Rev. Edition 2006

REFERENCES

1. Dr. R. K. Bansal , *A Textbook of Fluid Mechanics and Hydraulic Machines,* Laxmi Publications, 9th Edition, 2005
2. K.Subramanya, *Fluid Mechanics and Machinery (Problems and Solutions),*Tata McGraw Hill Education, 2005
3. E. Benjamin Wylie, K.W. Bedford ,*Fluid Mechanics*, Victor Streeter, Tata McGraw Hill Education, 9th Edition, 2017
4. C.S.P. Ojha, P.N. Chandamouli & R. Berndtsson, *Fluid Mechanics and Machinery*, Oxford University Press, 1st Edition, 2010
5. Rama Durgaiah D., *Fluid Mechanics and Machinery*, New Age International,1st Edition,2002

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(19CE0110) ENGINEERING GEOLOGY

COURSE OBJECTIVES

The objectives of the course is

1. *To study and identify different types of rocks and minerals and their properties*
2. *To know the importance of geology in civil engineering applications*
3. *To analyze the geological hazards and their effects for the safe development of civil works*

COURSE OUTCOMES (COs)

After completing the course, the students are able to

1. *Explain the importance of role of geology in civil engineering*
2. *Describe the concept of Weathering and its importance in civil constructions*
3. *Identify and classify Minerals, Rocks based on their properties*
4. *Analyze the Geological structures and their impact on civil engineering structure*
5. *Describe the principals of geophysical methods and their applications*
6. *Recognize the significance of earth quakes, landslide and ground water in the constructions of dams, reservoirs, tunnels and buildings*

UNIT – I

Introduction: Importance of Geology from Civil Engineering point of view – Failures of some Civil Engineering constructions due to geological drawbacks – Case Histories – Importance of Physical geology

Weathering: Types of Weathering – Factors Affecting Weathering – Its effects over the properties of rocks – Importance of Weathering with reference to dams, reservoirs, tunnels and bridges

UNIT – II

Mineralogy: Different methods of study of minerals – Advantages of study of Minerals by Physical properties – Study of physical properties of common rock forming minerals like, Quartz, Feldspar, Garnet, Mica, Olivine, Hornblende, Augite, Calcite, Talc, Kyanite, Bauxite and Clay Minerals

UNIT – III

Petrology: Origin and Formation of Rocks – Classification of Rocks – Structure and Textures of Rocks – Study of Rocks like Granite, Gabbro, Dolerite, Basalt, Breccia, Conglomerate, Sand Stone, Shale, Limestone, Laterite, Quartzite, Schist, Gneiss, Marble, Slate

UNIT – IV

Structural Geology: Elements of Structural Geology like Strike, Dip, Outcrop - Study of Folds, Joints, Faults, Unconformities and their importance in Civil Engineering Works

Geophysical Studies: Importance of Geophysical studies – Principles of geophysical study by Gravity methods, Magnetic Methods, Electrical methods, Seismic Methods, Radiometric methods and geothermal methods

UNIT – V

Groundwater, Tunnels and Landslides: Types of groundwater – Geological controls of Groundwater movement – Groundwater exploration. Earth Quakes - Causes and Effects of Earth Quakes - Seismic Waves, Richter scale, Precautions to be taken for Building Construction in Seismic Areas – Landslides - Their Causes and Effect - Measures to be taken to Prevent Their Occurrence

Dams, Reservoirs, Tunnels: Geology of Dams - Geological Considerations in the Selection of a Dam Site – Reservoirs – Tunnels - Purposes of Tunnelling - Effects of Tunnelling on the Ground - Role of Geological Considerations in Tunnelling - Over Break and Lining in Tunnels

TEXT BOOKS

1. N. Chenna Kesavulu, *Engineering Geology,* Mc-Millan India Ltd, Second Edition, 2014
2. Parbin Singh, *Engineering and General Geology,* Kataria, S.K.& Sons

REFERENCES

1. Subinoy Gangopadhyay, Engineering Geology, Oxford University Press
2. J.C.Harvey, Geology for Geotechnical Engineers, Cambridge University Press, 1982
3. K.V.G.K. Gokhale, Principals of Engineering Geology, B.S Publications

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(19CE0111) STRUCTURAL ANALYSIS

COURSE OBJECTIVES

The objectives of this course

1. *To have knowledge of maximum shear force and bending moment due to moving loads*
2. *To learn and analyze continuous beams and frames by slope deflection method, and moment distribution method*
3. *To learn and analyze continuous beams by flexibility method and stiffness methods*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Classify statically and kinematically determinate and indeterminate structures and outline role of equilibrium and compatible equations in structural analysis*
2. *Draw the shear force and bending moment at a section of a beam under moving load*
3. *Describe the concept of energy methods and apply theorems based on virtual work on analysis if deflection of beams and trusses*
4. *Analyze continuous beams and portal frames by slope deflection method*
5. *Analyze continuous beams and portal frames by moment distribution method*
6. *Analyze indeterminate structures such as continuous beams, portal frames using stiffness and flexibility matrix methods*

UNIT – I

Influence Lines and Moving Loads: Influence Lines for Reactions, BM and SF; Curves of Maximum BM and SF for Single, Two and Multipoint Loads, UDL Longer and Shorter than Span–Enveloping Parabolic and EUDL–Forces in Truss Member

UNIT – II

Energy Methods: Strain Energy Due to Axial Load, Bending Moment and Shear Forces–Virtual Work–Maxwell's–Betti's theorems–Castigliano's First Theorem and Unit Load Method–Deflection of Simple Beams and Pin-Jointed Trusses

UNIT – III

Slope Deflection Method: Slope Deflection Equation–Application to Continuous Beams with Degree of Indeterminacy Not Exceeding Three–Effect of Sinking–Analysis of Single Bay and Single Storey Portal Frames with and without Sway

UNIT – IV

Moment Distribution Method: Stiffness and Carry Over Factors–Distribution Factors–Analysis of Continuous Beams Degree of Indeterminacy Not Exceeding Three, Effect of Sinking - Analysis of Single Bay and Single Storey Portal Frames with and without Sway

UNIT – V

Matrix Methods of Structural Analysis: Static and Kinematic Indeterminacy of Structures – Equilibrium and Compatibility Conditions

Flexibility Method: Flexibility Methods–Applications to Continuous Beams (Degree of Static Indeterminacy Not Exceeding Three)

Stiffness Method: Introduction–Application to Continuous Beams (Degree of Kinematic Indeterminacy Not Exceeding Three)

TEXTBOOKS

1. Bhavikatti, S.S, *Structural Analysis – Vol. I* by, Vikas Publishing Pvt Ltd., New Delhi, 2010
2. Bhavikatti, S.S, *Structural Analysis – Vol. II* by, Vikas Publishing Pvt Ltd., New Delhi, 2013

REFERENCES

1. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, *Theory of structures*, Laxmi Publications Pvt. Ltd., New Delhi,2017
2. Vaidyanadhan, R and Perumal P, *Comprehensive Structural Analysis – Vol. 1 & Vol. 2*, Laxmi Publications Pvt. Ltd, New Delhi, 2003.
3. L.S. Negi & R.S. Jangid, *Structural Analysis*, Tata McGraw Hill Publications, New Delhi, 6th Edition, 2003
4. R. C. Hibbeler, Structural *Analysis*, Pearson Education, Ninth edition, 2017
5. Devdas Menon- *Structural Analysis*, Alpha Science International, Limited, 2010

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(19EE0233) INDUSTRIAL INSTRUMENTATION

COURSE OBJECTIVES

The objectives of this course are

1. *To analyze the Common errors that occur in measurement systems, and their classification*
2. *To understand the characteristics of signals, their representation, and signal modulation techniques*
3. *To learn the Methods of Data Transmission, Telemetry, and Data acquisition*
4. *To study working principles of different Signal Analyzers and Digital meters*
5. *To learn about several types of transducers and their use for measurement of non-electrical quantities*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Identify and explain the types of errors occurring in measurement systems*
2. *Differentiate among the types of data transmission and modulation techniques*
3. *Apply digital techniques to measure voltage, frequency and speed*
4. *Analyse the working principles of different Signal Analyzers and Digitalmeters*
5. *Understand the operation of several types of transducers*
6. *Choose suitable Transducers for the measurement of non-electrical quantities*

UNIT-I

CHARACTERISTICS OF SIGNALS AND THEIR REPRESENTATION: Measuring Systems, Performance Characteristics, Static Characteristics, Dynamic Characteristics; Errors in Measurement Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signals and their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation

UNIT-II

DATA TRANSMISSION, TELEMETRY AND DAS: Methods of Data Transmission– General Telemetry System .Frequency Modulation (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry Comparison of FM, PM, PAM and PCM Analog and Digital Data Acquisition Systems –Components of Analog DAS–Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing – Digital DAS–Block Diagram—Modern Digital DAS (Block Diagram)

UNIT-III

SIGNAL ANALYZERS, DIGITAL METERS: Wave Analysers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers-Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector

Impedance Meter, QMeter. Peak Reading and RMS Voltmeters, Digital Voltmeters- Successive Approximation, Ramp and Integrating Type- Digital Frequency Meter- Digital Multimeter- Digital Tachometer

UNIT-IV

TRANSDUCERS: Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle of Operation of Resistive, Inductive, Capacitive Transducers, LVDT, Strain Gauge and its Principle of Operation, Gauge Factor, Thermistors, Thermocouples, Synchros, Piezo electric Transducers, Photovoltaic, Photo Conductive Cells, Photo Diodes

UNIT-V

MEASUREMENT OF NON-ELECTRICAL QUANTITIES: Measurement of strain, Gauge Sensitivity, Measurement of Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level

TEXTBOOKS

1. A.K.Sawhney, *A course in Electrical and Electronic Measurements and Instrumentation,* Dhanpat Rai & Co., 2012
2. D.V.S.Murty, *Transducers and Instrumentation*, Prentice Hall of India, 2nd Edition, 2004

REFERENCES

1. A.Dhelfrick and W.D.Cooper, *Modern Electronic Instrumentation and Measurement Technique,* Pearson/Prentice Hall of India., 1990
2. H.S. Kalsi, *Electronic Instrumentation,* Tata McGraw-Hill, 2010
3. T.R.Padmanabhan, *Industrial Instrumentation – Principles and Design*, Springer

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(19ME0350) MECHANICAL MEASUREMENTS & CONTROL SYSTEMS

COURSE OBJECTIVES

Objective of this course is to

1. *Impart brief knowledge basic principles and performance characteristics of measurement*
2. *Familiarize student with basic principles to measure the temperature, pressure with the help of Thermocouple and different pressure gauges*
3. *Make the student learn measurement of Speed, Acceleration and Vibration with the help of various instruments*
4. *Enable the student to understand the measurement of Fuel level, measurement of Flow and Humidity, parameters like Force, Torque, Power and also learn about the basic principles, and applications of various control systems*
5. *Make the student to Select appropriate device for the measurement of parameters like temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance*

COURSE OUTCOMES (COs)

After completion of this course, the students will be able to

1. *State the basic principles of measurement systems and explain its performance characteristics*
2. *Distinguish the types of various temperature and pressure measurement instruments and finds the best one for the industrial applications*
3. *Explicate the principle of measurement of Speed, Acceleration and Vibration instruments and describe its working*
4. *Illustrate the operation of Fuel level, measurement of Flow and Humidity Measurement instruments and also state the applications of various control systems*
5. *Identify the appropriate device for the measurement of temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance*
6. *Classify the various types of control systems for the measurement of temperature, speed and position*

UNIT-I

Definition: Basic principles of measurement systems, configuration and functional descriptions of measuring instruments. Sources of error, Classification and elimination of error

Measurement of Displacement: Types & working- Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures

UNIT-II

Measurement of Temperature: Classification of temperature measuring instruments, Principles-Types- Expansion, Electrical Resistance - Thermistor - Thermocouple - Pyrometers - Temperature Indicators

Measurement of Pressure: Classification of pressure measuring devices -Principles- Manometers, Bourdon pressure gauges, Bellows - Diaphragm gauges. Low pressure measurement – Thermal Conductivity gauges - ionization pressure gauges, McLeod pressure gauge

UNIT - III

Measurement of Speed, Acceleration and Vibration: Tachometers, Seismic instruments - Vibrometer and accelerometer

Stress & Strain Measurements: Electrical strain gauge, Resistance strain gauge, compressive and tensile strains, Strain gauge Rosettes

UNIT -IV

Measurement of Level: Direct method - Indirect methods - capacitative, ultrasonic, magnetic, cryogenic fuel level indicators - Bubler level indicators

Flow Measurement: Rota meter, magnetic, Ultrasonic, Turbine flow meter, Hot - wire anemometer Laser Doppler Anemometer (LDA)

UNIT - V

Measurement of Force, Torque and Power: Elastic force meters, load cells, Torsion meters, Dynamometers

Elements of Control Systems: Classification - Open and closed systems Servo mechanisms - Temperature, speed & position control systems

TEXT BOOKS

1. Ernest O.Doebelin & Dhanesh N.Manik, *Measurement Systems: Application and Design*, TMH Publishers,7th edition
2. Thomas G.Beckwith, Roy D.Marangoni & John H.Lienhard V, *Mechanical Measurements*, Pearson Publishers,6th edition

REFERENCES

1. B.C.Nakra & KKChaudhry, *Instrumentation, Measurement & Analysis*, TMH Publishers, 3rd edition
2. R.K. Jain, *Mechanical and Industrial Measurements* , Khanna Publishers, 11th edition
3. AK. Tayal , *Instrumentation & mech. Measurements*, Galgotia Publication, 2nd edition

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(19EC0449) ELEMENTS OF EMBEDDED SYSTEMS

COURSE OBJECTIVES

The objectives of this course

1. *Able to understand the fundamental concepts of embedded systems*
2. *Able to learn the core of embedded systems*
3. *Able to learn to program the open source electronics*
4. *Able to understand the principles of Internet of Things (IoT)*
5. *Able to understand the concepts of Internet of Things (IoT)*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *Differentiate between general computing system and the embedded system, also recognize the classification of embedded systems*
2. *Enumerate and describe the components of an embedded system*
3. *Learn about open source electronics platform*
4. *Program an embedded system by interfacing sensors & actuators*
5. *Identify the basic building blocks of Internet of Things and characteristics*
6. *Implement their own ideas in various application areas of Embedded systems and IoT*

UNIT – I

Introduction to Embedded Systems: Definition –Embedded systems vs General computing systems – History – Classification – Purpose - Major application areas – Characteristics – Architecture of embedded system – CPU, RAM & ROM, timers, clocks, address bus &data bus – overview of design process of embedded systems – programming languages and tools for embedded design

UNIT – II

Typical Embedded System: Core of the embedded system– RISC vs CISC design philosophy– Memory – Harvard and Von-Neuman architecture–sensors and actuators– Other system components – reset, brownout protection, oscillator, RTC, Watch dog timer. Embedded firmware

UNIT – III

Communication: Communication Interfaces – Onboard (I2C, SPI, UART, 1-wire interface, parallel interface), External (RS-232 & RS-485, USB, IEEE 1394, IrDA, Bluetooth, Wi-Fi, ZigBee, GPRS

UNIT – IV

Designing of Embedded Systems with Arduino Microcontrollers: Introduction to Arduino platform– Overview of Arduino UNO board–ATMega328/P Block diagram–Pin functions–

Introduction to Arduino programming –Interfacing & programming sensors –Interfacing & programming actuators interfacing & programming serial communication devices

UNIT – V

Introduction to IoT: Introduction to Internet of Things– reference architecture of IoT– Internet principles – IP addresses, MAC addresses, TCP and UDP ports– Application layer protocols– Data protocols– MQTT, XMPP, CoAP– challenges of IoT, Case studies demonstrating IoT – Home automation, cities, Environment, Agriculture

TEXT BOOKS

1. Shibu K V, *Introduction to Embedded systems*, Tata McGraw-Hill Education, 1st Edition, 2009
2. Raj Kamal, *Embedded systems*, Tata McGraw-Hill Education, 2nd Edition, 2011
3. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press/Orient Black Swan Pvt. Ltd, 1st Edition, 2015

REFERENCES

1. https://store.arduino.cc/arduino-uno-rev3
2. https://www.arduino.cc/reference/en/
3. https://wso2.com/whitepapers/a-reference-architecture-for-the-internet-of-things/
4. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things*, John Wiley and sons Ltd, 1st Edition, 2014

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(19CS0551) JAVA PROGRAMMING

COURSE OBJECTIVES

The objectives of this course

1. *Introduce standard tools and techniques for software development*
2. *Understand the object oriented approach for automated software build process*
3. *Introduce the concepts of AWT framework*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Implement simple abstract data types and design abstraction functions*
2. *Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity*
3. *Apply object-oriented design patterns for problem solving*
4. *Implement Exception handling with synchronization*
5. *Execute programs on Multithreading and String handling concepts*
6. *Design applications with an event-driven graphical user interface*

UNIT- I

The Java Language: Importance of Java - Programming Paradigms - The History and Evolution of Java - Java Byte Code

Introduction of OOP: Abstraction, Encapsulation, Inheritance, Polymorphism -Understanding static -Varargs -Data Types -Type Casting - Java Tokens - Java Statements –Arrays

UNIT- II

Introducing Classes: Class Fundamentals - Declaring Objects -Introducing Methods Introduction to Constructors - Garbage Collection - Introducing final - Inheritance - Method Overriding - Abstract classes - Packages and Interfaces

UNIT- III

Exception Handling: Exception Fundamentals - Exception Types -Uncaught Exceptions - Using try and catch - Nested try Statements -throw -throws –finally -Creating Your Own Exception Subclasses - Chained Exceptions

UNIT-IV

Multithreaded Programming: The Java Thread Model -Thread Priorities -The Thread Class and the Runnable Interface - Creating Multiple Threads -Using isAlive( ) and join( ) – Synchronization- String Handling

UNIT- V

Generics: A simple Generic Example-General form of Generic class -Generic Interfaces

Collection Framework-Collections overview, Collection class, Collection interfaces
Introducing the AWT: Using AWT Controls-Layout Managers -Introducing Swing -Exploring Swing

TEXT BOOKS

1. Herbert Schildt, *The Complete Reference Java,* Eighth Edition, McGraw Hill
2. Y Daniel Liang, *Introduction to Java programming*, Que E &T

REFERENCES

1. Cay S. Horstmann, *Core Java Volume –I Fundamentals*, Prentice Hall , 10th Edition, 2015.
2. Deitel&Deitel, *Java How to Program*, Prentice Hall, 10th Edition, 2016.
3. Herbert Schildt ,*Java: A Beginner's Guide*, Sixth Edition, Oracle Press, 2014.

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(19HS0814) INTELLECTUAL PROPERTY RIGHTS

COURSE OBJECTIVES

The objectives of this course

1. *To provide an understanding of the concept and significance of intellectual property rights*
2. *To understand the concept of trademarks, copy rights, patents and the need for their protection*
3. *To comprehend the concept of competition, unfair competition and the latest developments in the laws pertaining to intellectual property rights*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Become aware of intellectual property rights, concepts, treaties, agencies and international organizations involved in sanctioning IP rights*
2. *Identify different types of intellectual properties, ownership rights and the scope of the protection*
3. *Get an adequate knowledge on patents, trademarks, copy rights and to get property rights for their intellectual work*
4. *Able to identify, apply, and assess ownership rights, registration processes for IP rights*
5. *To discern the approaches for intellectual property management and intellectual property audits*
6. *Demonstrate knowledge and understanding on unfair competition and latest developments in IP rights at international level*

UNIT – I

INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction - Types of Intellectual Property - International Organizations, Agencies and Treaties - Importance of Intellectual Property Rights

UNIT – II

TRADE MARKS: Purpose and Function of Trademarks - Acquisition of Trademark Rights - Protectable Matter, Selecting and Evaluating Trademarks - Trademarks registration processes

UNIT – III

LAW OF COPY RIGHTS: Fundamental of Copy Right Law - Originality of Material - Rights of Reproduction - Rights to perform the work publicly - Copy Right Ownership Issues - Copy Right Registration - Notice of Copy Right - International Copy Right Law

LAW OF PATENTS: Foundation of Patent Law - Patent Searching Process - Ownership Rights and Transfer

UNIT – IV

TRADE SECRETS: Trade Secrets Law - Determination of Trade Secrets Status - Liability for misappropriations of Trade Secrets - Protection for submission - Trade secret elitigation

UNFAIR COMPETITION: Misappropriation Right of Publicity - False Advertising

UNIT – V

NEW DEVELOPMENT OF INTELLECTUAL PROPERTY: New Developments in Trade Mark Law - Copy Right Law - Patent law - Intellectual Property Audits - International Overview on Intellectual Property - International Trade Mark Law - Copy Right Law - International Patent Law - International Development in Trade Secrets Law

TEXT BOOKS

1. Deborah, E. Bouchoux, *Intellectual Property Right*, Cengage learning
2. Nityananda KV, *Intellectual Property Rights: Protection and Management*, Cengage Learning India Private Limited

REFERENCES

1. Prabuddha Ganguli, *Intellectual Property Right - Unleashing the Knowledge Economy* Tata McGraw Hill Publishing Company Ltd
2. Ahuja VK, *Law relating to Intellectual Property Rights*, Lexis Nexis, India
3. Neeraj P & Khushdeep D, *Intellectual Property Rights*, PHI Learning Pvt Limited, India

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(19CE0112) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

COURSE OBJECTIVES

The objectives of this course

1. *To learn the concepts of Venturimeter & Orifice meter*
2. *To learn the concepts of notch's*
3. *To learn the basic concepts of turbines*
4. *To learn the basics concepts of different types of pumps*

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. *Calibrate Venturimeter & Orifice meter*
2. *Calculate losses in flows*
3. *Estimate the efficiency of different pumps*
4. *Study the performance of different turbines*
5. *Study importance of liquid properties and its methods of determination*
6. *Calculate forces and pressure due to fluid action under different conditions*

LIST OF EXPERIMENTS

1. Verification of Bernoulli's equation.
2. Calibration of Coefficient of discharge for Venturimeter.
3. Calibration of Coefficient of discharge for Orifice meter.
4. Calibration of Friction factor. (Major losses experiment)
5. Determination of loss of head due to sudden contraction (Minor losses experiment)
6. Impact of jet on vanes.
7. Performance test on Pelton wheel turbine.
8. Performance test on Francis turbine.
9. Efficiency test on centrifugal pump.
10. Study on Hydraulic jump.

Any eight experiments may be conducted

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(19CE0113) ENGINEERING GEOLOGY LAB

COURSE OBJECTIVES

The objectives of this course

1. *Study of physical properties and identification of minerals and Rocks*
2. *Drawing of sections for Geological maps showing tilted beds, faults, uniformities etc.*
3. *Solve simple structural geology problem*

COURSE OUTCOMES (COs)

After performing these experiments, the students are able to

1. *Identify and classify minerals by their Physical properties*
2. *Identify and classify Rocks by their Physical properties*
3. *Draw the sections for geological maps showing tilted beds, faults, uniformities*
4. *Interpret the geological maps on practical applications in Civil Engineering*
5. *Follow standards in geological investigations*
6. *Analyze the Structural Geology Problems*

LIST OF EXPERIMENTS

1. Study of Physical Properties and Identification (any six minerals)
2. Study of Physical Properties and Identification of Igneous, Sedimentary and Metamorphic Rocks (two rocks from each category totaling six rocks)
3. Study of Geology maps and Interpretation of Geological Sections (any two map and any two models)
4. Study of Structural Geology problems (any two strike and dip problems)

TEXT BOOKS

1. CVRK Prasad, *Elementary Exercises in Geology*, Universities press

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(19CE0114) GIS LAB

COURSE OBJECTIVES

The objectives of this course

1. *To know the fundamentals of Geographical Information System*
2. *To Learn how to solve the case examples by using GIS*
3. *To Develop GIS interface to field problems through georeferencing.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Describe the basic components of GIS*
2. *Classify the maps, coordinate systems and projections*
3. *Create the new maps by using the old maps through mosaicing*
4. *Study GIS data with case examples on mapping*
5. *Solve the geospatial problems using the GIS interface*
6. *Prepare different Geo spatial layers*

Experiment – I

Development of Georeferencing of maps either from cadastral or AutoCAD based map

Experiment – II

Identification of best locations of ground control points and mosaicing the different sources of maps of information like topo sheets & satellite data and other drawings

Experiment – III

Digitization and GIS coordination

Experiment – IV

GIS interface and features using open Source Software QGIS

Experiment – V

Case example on mapping like water distinguish, Road alignment road network etc.,

TEXT BOOKS

1. Lo,C.P. & Yeung A.K.W. *Concepts and Techniques of Geographic Information Systems*, Prentice Hall of India, New Delhi, 2002
2. Burrough, P.A., *Principles of Geographical Information Systems,* Oxford Publication, 1998
3. Chestern, *Geo Information Systems – Applications of GIS and Related Spatial Information Technologies,* ASTER Publication Co., 1992

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(19HS0817) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

COURSE OBJECTIVES

The objectives of this course

1. *To impart basic principles of thought process, reasoning and inference*
2. *To connect society and nature through sustainability*
3. *To know Holistic life style of yogic science and wisdom capsules in Sanskrit literature*
4. *To introduce Indian knowledge system and Indian perspective of modern scientific world-view*
5. *To learn the basic principles of Yoga and holistic health care system*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Connect up the basic principles of thought process*
2. *Understand Holistic life style of yogic science and wisdom capsules in Sanskrit literature*
3. *Analyze the society and nature through sustainability*
4. *Explain Indian knowledge system and Indian perspective of modern science*
5. *Use the basic principles of Yoga and holistic health care system*
6. *Apply the holistic health care system*

UNIT- I

Basic structure of Indian Knowledge System: 4 ved – 4 Upaved (Ayurved, Dhanurved, GandharvaVed & SthapthyaAdi.,)

UNIT- II

6 Vedanga (Shisha, Kalppa, Nirukha, VYkaran, Jyothish & Chand) - 4 Upanga (Dharma Shastra, Meemamsa, Purana & Tharka Shastra)

UNIT- III

Modern Science and Indian Knowledge System - Yoga and Holistic Healthcare

UNIT IV

Philosophical Tradition (Nyaya, ,Sankhya, Yog, Jain & Boudha) - Indian Linguistic Tradition – (Phonology, morphology, syntax and semantics)

UNIT V

Indian Artistic Tradition - Chitrakala, Vasthukala, Sangeetha, Nruthya Sahithya - Case Studies

TEXT BOOKS

1. V.Sivaramakrishnan(Ed.),*Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. S.C. Chaterjee & D.M. Datta, *An Introduction to Indian Philosophy*, University of calcutta, 1984

REFERENCES

1. VN Jha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay Foundation, Velliarnad, Arnakulam
2. Ramakrishna Mission *Yoga Sutra of Patanjali*, Kolkata GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with Vyasa Bhashya*, Vidyanidhi Prakashan, Delhi 2016
3. RN Jha, *Science of Consciousness Psychotherapyand Yoga Practices*, Vidyanidh Prakashan, Delhi 2016
4. Krishna Chaitanya, *Arts of India*, Abhinav Publications, 1987

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(19CE0115) ESTIMATION, COSTING AND VALUATION

COURSE OBJECTIVES

The objectives of this course

1. *To learn the main items of work in building and different types of estimates.*
2. *To understand the quantity calculations of various items of building works, roads and canal*
3. *To learn various specifications and the rate analysis of various items of building works*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Apply different methods of estimates for calculating the quantities of building works*
2. *Calculate the quantity of earthwork in roads and canals*
3. *Estimate the quantities of the reinforcement in the beams, slabs, columns with foundation and staircase*
4. *Work out the rate analysis of various items of building works*
5. *Explain specifications of various items of building works*
6. *Assess valuation of assets*

UNIT – I

Estimating and Estimate of buildings: Estimate – Types of estimates – Main items of work – Units of measurements – Methods of building estimates – Detailed estimates of buildings using individual wall method and centre line method

UNIT – II

Road estimating and Earth work for canals: Estimate of earthwork by Mid-section, Trapezoidal and Prismoidal formula – Estimate of pitching of slopes – Estimate of earthwork from L-sections – Estimate of earthwork in hill road – Estimate of metalled road – Estimate of C.C. Track way – Earthwork in canals

UNIT – III

R.C.C works: Percentage steel reinforcement – Standard hooks and cranks of reinforcement bars – Estimate of R.C.C. slab – Estimate of R.C.C. beam – Estimate of R.C.C. T-beam slab – Estimate of R.C.C. column with foundation – Estimate of R.C.C. staircase – Estimate of R.C.C. staircase

UNIT – IV

Analysis of rates: Analysis of rates of building works – Earth work – Cement concrete in foundation – Reinforced cement concrete – Damp proof course – Brickwork – Stone masonry – Flooring – Roofing – Plastering – Finishing

UNIT – V

Specifications: Detailed specifications of building works – Earthwork – Cement concrete – Reinforced cement concrete – Damp proof course – Brickwork – Plastering – Pointing– Cement concrete floor – Mosaic floor – White and colour washing – Painting – Varnishing – Woodwork – Doors and Windows

Valuation: Valuation – Purpose of valuation – Gross income – Net income – Outgoings –Scrap value – Salvage value –Capital cost – Year's purchase – Sinking fund – Depreciation – Methods of valuation – Valuation of Freehold & Leasehold properties – Fixation of rent

TEXTBOOKS

1. B.N. Dutta, *Estimating and Costing in Civil Engineering*, UBS publishers,27th Revised Edition, 2017
2. M. Chakraborthi, *Estimation, Costing, Specifications and Valuation in Civil Engineering*, Chakraborthi publisher, 24th Edition, 2010

REFERENCES

1. B.S. Patil, *Civil Engineering Contracts and Estimations*, Universities Press,4th Edition, 2015
2. G.S.Birdie, *Estimating and Costing*, Dhanpat Rai Publisher,2014
3. D.D.Kohli and Ar.R.C.Kohli, *Estimation and Costing(Civil),* S.Chand &Company Pvt.Ltd,2013

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(19CE0116) HYDRAULIC ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *To relate the theory and practice of problems in hydraulic engineering*
2. *To learn the behavior of types of flows, types of channels*
3. *To learn the different hydraulic models*
4. *To learn the basics of turbo machinery, hydraulic turbines and performance of turbines*

COURSE OUTCOMES (COs)

On completion of the course, the students will able to

1. *Discuss uniform and non-uniform open channel flows and Design economic channel section*
2. *Explain gradually varied flow and rapid varied flow*
3. *Analyze impact of jets on vanes and develop velocity triangle*
4. *Classify turbines and study the principal of various turbines*
5. *Study the principals of different pumps*
6. *Classify methods of dimensional analysis and Apply Buckingham Pi theorem*

UNIT-I

Uniform Flow: Classification of flows -Differences between pipe flow and open channel flow - Flow analysis: The Chezy's equation, Empirical formulae for the Chezy's constant - Hydraulically economical sections

Non-Uniform Flow: Concept of specific energy -Specific energy curves-Critical flow – Critical depth- Computation of critical depth – Critical, sub critical and super critical flows - Channel transitions - Specific force - Specific force curve

UNIT-II

Gradually Varied Flow: Dynamic equation for GVF in wide rectangular channel - Classification of channel bottom slopes - Back water curves and Draw down curves - Surface profiles - various types of water surface profiles - Characteristics of surface profiles Computation of surface profiles by step method

Rapidly Varied Flow: Hydraulic jump - Elements and characteristics of hydraulic jump - Hydraulic jump in rectangular channels Height and length of the jump -Types of hydraulic jump Applications of hydraulic jump

UNIT III

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes - jet striking centrally and at tip - Velocity triangles at inlet and outlet - Expressions for work done and efficiency- Angular momentum principle

UNIT-IV

Pumps: Centrifugal Pumps - Component parts and working of a centrifugal pump - Work done by the impeller-heads, losses and efficiencies, minimum starting speed, priming - Specific speed, Multistage centrifugal pumps - Troubles and remedies

Dimensional Analysis and Similitude: Dimensional homogeneity - Methods of dimensional analysis- Rayleigh's method - Buckingham - Pi theorem - Similitude - Types of similarities - Model laws

UNIT-V

Hydraulic Turbines-I: Layout of Hydro-electric power plant - Head and efficiencies of hydraulic turbines-Classification of turbines - Pelton wheel –Francis turbine-Working, Working proportions, Velocity triangles, work done and efficiency ,hydraulic design

Hydraulic Turbines-II: Kaplan turbine: main components and working - Working proportions - Draft tube: theory and efficiency - Specific speed – NPSH - Cavitation: causes, effects

TEXT BOOKS

1. Dr. P.N. Modi & Dr. S.M. Seth, *Hydraulics and Fluid Mechanics including Hydraulics Machines (A-4-Size)*,Standard BookHouse,21th Edition,2018
2. *Er.R.K.Rajput, A Textbook of Fluid Mechanics and Hydraulic Machines,* S.Chand Publications,3rd Rev. Edition,2006

REFERENCES

1. Dr. R. K. Bansal, *A Textbook of Fluid Mechanics and Hydraulic Machines,* Laxmi Publications,9th Edition,2005
2. K.Subramanya, *Fluid Mechanics and Machinery(Problems and Solution)*,Tata McGraw Hill Education,2005
3. E. Benjamin Wylie, K.W. Bedford, *Fluid Mechanics*, Victor Streeter, Tata McGraw Hill Education, 9th Edition,2017
4. C.S.P. Ojha, P.N. Chandamouli & R. Berndtsson, *Fluid Mechanics and Machinery*, Oxford University Press, 1st Edition,2010
5. Rama Durgaiah D, *Fluid Mechanics and Machinery*, New Age International,1st Edition,2002

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(19CE0117) GEOTECHNICAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *To explain how three phase system is used in soil and how are soil properties estimated using three phase system, carry out soil classification*
2. *To explain role of water in soil behavior and how soil stresses, permeability and quantity of seepage including flow net are estimated*
3. *Ability to apply the principle of shear strength and settlement analysis for foundation system*
4. *To explain Earth slopes and its stability Analysis*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Describe volumetric ratios, weight/mass relationships, index properties of soils, establish interrelationships and classify soils*
2. *Discuss Soil permeability, effective stress principal and seepage though soils*
3. *Classify compaction and consolidation and predict consolidation settlements*
4. *Determine vertical stress due to various loads and comprehend shear strength of soil*
5. *Can use various methods to analyze stability of finite and infinite earth slopes*
6. *Describe various means to conduct soil exploration and can interpret soil exploration report*

UNIT – I

Introduction: Soil formation - Structure of soils –Volumetric ratios – Phase diagram of Soils – Mass-Volume relationships -Weight-Volume relationships– Interrelationships – Relative Density - Index properties - Sieve analysis - Consistency limits -Indian Standard Classification System – Clay Mineralogy

Permeability: Soil Permeability – Darcy's law -Constant Head Permeability Test-Falling Head Permeability Test-Factors affecting Permeability -Permeability of Layered soils

Effective Stress: Principle of Effective Stress–Quick Sand condition – Seepage through soils – Flow Net for Two-dimensional flow–Applications of Flow Net

UNIT-II

Compaction: Compaction phenomenon– Factors affecting compaction - Effects of compaction on soil properties –Standard and Modified Proctor's test - Field Compaction methods

Consolidation: Types of Consolidation -Consolidation test -Terzaghi's One Dimensional Consolidation Theory-e-p and e-log p curves

UNIT – III

Stress Distribution in Soils: Boussinesq's equation for point load - Line Load – Strip load – Rectangle load – Circular load -Westergaard's equation- Pressure Bulbs– Newmark's Influence Chart

Shear Strength of Soils: Stress at a point - Mohr's Circle of stress- Mohr's-Coulomb Failure Theory -Methods of determining the shear strength parameters - Types of shear tests based on drainage conditions

UNIT – IV

Earth Slope Stability: Types of Slope Failures -Factor of safety- Stability analysis of Infinite slopes of Cohesionless and Cohesive soils -Friction Circle Method - Method of Slices - Bishop's Simplified-Taylor's Stability Number

UNIT – V

Soil Exploration: Stages in Sub-surface explorations - Open excavation methods of soil exploration - Boring for exploration - Sampling in soils -Standard Penetration Tests - Cone Penetration Test -Field Plate Load Test- Execution of soil exploration program and report

TEXTBOOKS

1. K.R.Arora, *Soil Mechanics and Foundation Engineering,* Standard Publishers and Distributors, Delhi,7th edition, 2019
2. C.Venkataramaiah, *Geotechnical Engineering,* New Age Publications, 6th edition, 2018

REFERENCES

1. V.N.S. Murthy, *Soil Mechanics and Foundation Engineering,* CBS Publishers and Distributor's,2016
2. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation,* Laxmi publications Pvt. Ltd., New Delhi, 2017
3. Manoj Dutta & Gulati S.K, *Geotechnical Engineering*, McGraw-Hill Publishers, New Delhi, 2010
4. GopalRajan and A.S.R. Rao, *Basic and Applied Soil Mechanics,* New Age Publications, *2nd revised edition*, 2014

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III B.Tech – I Sem.

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(19CE0118) TRANSPORTATION ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *To familiarize with various elements and geometric design of highways*
2. *To learn the various aspects of pavement design*
3. *To understand the various aspects of Railway Engineering*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Recognize significance of highway alignment and can carry out engineering surveys for highway location*
2. *Design various geometric elements of highway*
3. *Implement traffic studies, traffic regulations and can design intersection and traffic signals*
4. *Design flexible and rigid pavements as per IRC*
5. *Describe different components of permanent way in Railway Track*
6. *Design various components of Railway Track*

UNIT – I

Highway Alignment and Surveys: Highway alignment - Basic requirements - Controlling factors - Engineering surveys for highway location

Highway Geometric Design: Importance of geometric design- Design controls and criteria- Highway cross section elements- Sight distance elements- Stopping sight distance, Overtaking sight distance and intermediate sight distance- Design of horizontal alignment- Design of super elevation and Extra widening- Design of Transition curves-Design of vertical alignment- Gradients- Vertical curves

UNIT – II

Traffic Engineering: Traffic studies - Flow - Speed - Travel time - Delay and O-D study – PCU - Peak hour factor - Parking study - Accident study - Highway capacity and level of service of rural highways and urban roads. Traffic signs - Types - Traffic signals - Types - Signal design by Webster's method - Design of Intersections

UNIT – III

Pavement Design: Types of pavement - Components and their functions - Design factors - Flexible pavement design (IRC: 37-2012) - IRC methods based on CBR only - Rigid pavement design (IRC: 58-2011) - Calculation of stresses - Design of Dowel bars and Tie bars

UNIT – IV

Railway Engineering: Permanent way components - Cross section of permanent way - Functions and requirements of Rails, Sleepers and Ballast - Types of gauges - Creep of rails - Theories related to creep - Coning of wheels - Adzing of sleepers - Rail fastenings

UNIT – V

Geometric Design of Railway Track: Gradients - Grade compensation - Cant and negative super elevation - Cant deficiency - Degree of curves - Safe speed on railway track - Points and Crossings - Layout and functioning of left hand turn out and right hand turn out - Station yards - Signalling and Interlocking

TEXT BOOKS

1. S.K.Khanna & C.E.G.Justo, *Highway Engineering*, New Chand & Bros,10th edition, 2012
2. S.C.Saxena and S.P.Arora, *A Text Book of Railway Engineering*, Dhanpat Rai Publications, New Delhi, 2011

REFERENCES

1. L.R.Kadiyali and Lal, *Traffic Engineering and Transportation Planning*, Khanna Publications, 9th edition, 1999
2. L.R.Kadiyali and Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications, 7th edition, 2013
3. Rangwala SC, *Railway Engineering*, Charotar Publishing House Pvt. Ltd., 27th edition, 2017

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(19EE0239) SOLAR PHOTOVOLTAIC SYSTEMS

COURSE OBJECTIVES

The objectives of the course are

1. *To develop a comprehensive technological understanding in solar PV system components*
2. *To provide in-depth understanding of design parameters to help design and simulate the performance of a solar PV power plant*
3. *To pertain knowledge about planning, project implementation and operation of solar PV power generation*

COURSE OUTCOMES (COs)

After the end of the course, a student should be able to

1. *Understand of renewable and non-renewable sources of energy*
2. *Gain knowledge about working principle of various solar energy systems*
3. *Analyse the solar power PV power generation*
4. *Applying the knowledge on to installation and integration of PV modules for different applications*
5. *Understand the operation of different solar collectors in the market*
6. *Understand the solar thermal energy storage systems*

UNIT-I

Introduction: Sources of renewable energy; global potential for solar electrical energy systems - Solar radiation - Extra-terrestrial and terrestrial solar spectrum; clear sky direct-beam radiation; total clear sky insulation on a collecting surface; radiation on the collector in tracking systems; calculation of average monthly insolation from measured data

UNIT-II

PV Cells and Modules: Solar Cell and its function, Solar Technologies, Solar Cell Parameters, Efficiency of Solar Cell, Solar PV Module, Rating of Solar PV Module, PV Module Parameters, Efficiency of PV Module, Measuring Module Parameters

UNIT-III

Solar Photovoltaic Module Array: Connection of PV Module in Series and Parallel, Estimation and Measurement of PV Module Power, Selection of PV Module

UNIT-IV

Solar PV System Design and Integration: Solar Radiation Energy Measurements, Estimating Energy requirement, Types of Solar PV System, Design methodology for SPV system, Design of Off Grid Solar Power Plant, Case studies of 3KWp Off grid Solar PV Power Plant, Design and Development of Solar Street Light and Solar Lantern, Off Grid Solar power Plant.

UNIT-V

Solar Collectors and Solar Energy Storage: Different types of solar collectors, Flat plate and concentrated type collectors, Fundamental Terminologies of thermal storage, Sensible heat storage materials, Latent heat storage materials, Solar thermo-chemical energy storage systems, Advantages and disadvantages of solar thermal storage, application of thermal storage

TEXT BOOKS

1. Chetansingh solanki, *Solar Photovoltai,* PHI, Learning private Ltd., New Delhi, 2018
2. G.D Rai, *Non-conventional Sources of Energy,* Khanna Publishers, Delhi, 2012

REFERENCES

1. Chetan Singh Solanki, *Renewable Energy Technologies; A Practical Guide for Beginners,* PHI School Books (2008)
2. Kothari D.P. and Signal K.C, *Renewable Energy Sources and Emerging Technologies,* New Arrivals –PHI; 2 Edition (2011)

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(19ME0321) NON- CONVENTIONAL ENERGY RESOURCES

COURSE OBJECTIVES

The objective of the course is to

1. *Know the importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Recognize the significance of Solar energy, its harnessing technologies& its applications*
3. *Identify the method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation*
4. *Explain the concept of bio energy and its conversion devices*
5. *Differentiate various renewable energies such as tidal energy, geothermal energy, fuel cells etc.*

COURSE OUTCOMES (COs)

On successful completion of the course, the student will be able to

1. *State various sources of Energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the Wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the Biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC, Fuel cell, etc. for effective construction of Hybrid systems.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies*

UNIT-I

Introduction: Energy- World Energy use – Classification of Energy's- Reserves of Energy Resources– Environmental Aspects of Energy Utilization

Renewable Energy: Need Of Renewable Energy– Renewable Energy Scenario in Andhra Pradesh, India and Around the World.

UNIT-II

Solar Thermal Conversion: Flat Plate and Concentrating Collectors – Solar direct Thermal Applications– Solar thermal Power Generation

Photo Voltaic Conversion: Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications, Solar Radiation Measurements

UNIT-III

Wind Energy: Wind Formation -Site Selection for Wind Turbine - Working Principle of Wind Turbine

Wind Energy System: Types of Wind Energy Systems – Performance – Details of Wind Turbine– Wind Energy Measurement, Safety and Environmental Aspects.

UNIT-IV

Bio – Energy: Biomass direct combustion – Biomass gasifiers – Biogas plants

Bio Fuel: Ethanol production – Biodiesel – Cogeneration - Biomass Applications

UNIT-V

Other Sources of Energy: Tidal energy – Wave Energy – Open and Closed OTEC Cycles, Geothermal Energy

Hydrogen Fuel: Hydrogen production and Storage - Fuel Cell Systems – Hybrid Systems.

TEXT BOOKS

1. R.K.Rajput , *Non-conventional Energy Sources and Utilization,* S. Chand Publishers, 2nd Edition, 2014
2. G. D Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 1st Edition, 2010.
3. Nicholas Jenkins & Janaka Ekanayake, *Renewable Energy Engineering*, Cambridge University Press; 1st Edition, 2017.

REFERENCES

1. Dr. R K Singal, *Non-Conventional Energy Resources*, S.K Kataria& Sons, 4th Edition, 2014
2. John Twidell& Tony Weir, *Renewable Energy Sources*, Routledge publisher, 3rd Edition, 2015
3. Sukhatme. S.P, *Solar Energy, Principles of Thermal Collection and Storage,* Tata McGraw Hill Publishing Company Limited, 6th Edition, 1990

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(19EC0450) INTRODUCTION TO IOT

COURSE OBJECTIVES

The objectives of this course are:

1. *To provide an overview on the ICT ecosystem and enabling environment to foster Internet of Things (including technology, standards, system management and applications) deployments.*
2. *Define the infrastructure for supporting IoT deployments.*
3. *To provide an understanding of the technologies and the standards relating to the Internet of Things.*
4. *Understand various case studies related to IoT domain.*

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. *Understand the technology and standards relating to IoTs*
2. *Understand where the IoT concept fits within the broader ICT industry and possible future trends.*
3. *Understand the key components that make up an IoT system.*
4. *Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack.*
5. *Configure Raspberry Pi, Understand Sensors, and Actuators & get started with python on Raspberry Pi*
6. *Apply the knowledge and skills acquired during the course to design, build and test a complete, working IoT system involving prototyping, programming and data analysis.*

UNIT – I

IoT Introduction & Concepts: Introduction to Internet of Things - Physical Design of IoT - Logical Design of IoT - IoT Enabling Technologies - IoT Levels & Deployment Templates.

UNIT – II

Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Retail – Logistics - Agriculture – Industry - Health & Lifestyle.

UNIT – III

IoT and M2M: Introduction – M2M – Difference between IoT an M2M - Software Defined Networking - Network Function Virtualization for IoT.

Developing Internet of Things: IoT Design Methodology – Motivation for using Python

UNIT – IV

IoT Physical Devices & Endpoints: IoT Device – Raspberry Pi Board - Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming raspberry Pi with Python – Other IoT devices.

UNIT – V

Case Studies Illustrating IoT Design: Home Automation – Cities – Environment – Agriculture – Productivity applications.

TEXT BOOKS

1. Vijay Madisetti – Arshdeep Bahga, *Internet of Things a Hands- on Approach*, Arshdeep Bahga & Vijay Madisetti ,1st Edition, 2014.
2. Pethuru Raj and Anupama C. Raman, *The Internet of Things: Enabling Technologies, Platforms, and Use Cases*, CRC Press, 1st Edition, 2014

REFERENCES

1. Raj Kamal, *Embedded Systems*, Tata McGraw-Hill Education, 2nd Edition, 2011.
2. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things*, John Wiley and sons Ltd, 1st Edition, 2014
3. Daniel Kellmereit - Daniel Obodovski, *The Silent Intelligence: The Internet of Things*, DnD Ventures, 1st Edition, 2013

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(19CS0545) SOFTWARE DEVELOPMENT & TESTING

COURSE OBJECTIVES

The objectives of this course is to

1. Illustrate the Software Development Models
2. Explain Software Requirements Engineering Process and SRS document
3. Illustrate the importance of modeling and modeling languages
4. Explain various testing methodologies
5. Explain Quality assurance and test cases

COURSE OUTCOMES (COs)

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

1. Define and develop as software project from requirement gathering to implementation
2. Ability to code and test the software
3. Ability to plan, estimate and maintain software systems
4. Understand the basic testing procedures
5. Able to generate test cases and test suites.
6. Test the applications manually by applying different testing methods and automation tools.

UNIT-I

Introduction: Introduction to Software Engineering , Software Process, Software Myths, A generic view of process, A layered Technology, A Process Framework, Software Process Models, Unified process

Introduction to Agility: Agility, Agile Process, Agile Process Models

UNIT-II

Requirements Analysis and Specification: Requirements Engineering, Eliciting Requirements, Requirements Analysis, Types of Requirements, Requirement Modeling and Data Modeling concepts.

Architectural Design Concepts: The Design Process, Design Concepts, Design Model, Software Architecture, Architecture Styles.

UNIT-III

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.

Web App Design: Introduction, Web App Interface Design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Component-Level Design

UNIT-IV

Software Testing: Introduction, Levels of Software Testing – Unit Testing, Module Testing, Integration Testing, System Testing, Acceptance Testing, Alpha Testing, Beta Testing,

Approach to Software Testing: Types of Software Testing - Black Box Testing, White Box Testing, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Art of Debugging.

UNIT-V

Software Quality: Software Testing Life Cycle, Software Quality, Testing Principles, Test Process – Testing Activities, Quality Assurance.

Software Test Cases: Introduction to Test cases, Test Case Selection – Test Planning and Design – Test Execution – Case Study on Test tools and automation.

TEXT BOOKS

1. Roger S.Pressman, *Software Engineering- A practitioner's Approach,* McGraw-Hill International, Seventh edition, 2001.
2. Boris Beizer, Dreamtech, *Software Testing techniques*, Second Edition

REFERENCES

1. Ian Sommerville, *Software Engineering*, Pearson Education, 8th Edition, 2008
2. Richard Fairley, *Software Engineering Concepts*, McGraw Hill, 2004
3. Dr.K.V.K.K.Prasad, *Software Testing Tools*, Dreamtech

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(19HS0861) BUSINESS ETHICS

COURSE OBJECTIVES

The objective of the course is to

1. *To provide basic knowledge of business ethics, personal ethics and values in modern context*
2. *To learn and develop best ethical practices in management disciplines to become good managers*
3. *To make them learn role of corporate culture and corporate governance*

COURSE OUTCOMES (COs)

On successful completion of the course, the student will be able to

1. *Apply various ethical principles in business and corporate social responsibility practices*
2. *Recognize how personal ethics can influence behavior and apply in decision making*
3. *Explain the ethical challenges facing the various functional departments*
4. *Identify the organizational and cultural variables that impact ethical judgment*
5. *Analyze various ethical codes in corporate governance*
6. *Identify organizational policies and systems that employ ethical conduct*

UNIT - I

Business Ethics: Introduction – Meaning - Scope – Types of Ethics – Characteristics – Factors influencing Business Ethics – Importance of Business Ethics - Arguments for and against business ethics- Basics of business ethics - Corporate Social Responsibility – Issues of Management – Crisis Management

UNIT - II

Personal Ethics: Introduction – Meaning – Emotional Honesty – Virtue of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind.

UNIT - III

Ethics in Management - I

Introduction – Ethics in HRM – Ethics in HRM: Selection, Training and Development – Ethics at work place – Ethics in performance appraisal - Marketing Ethics –Technology Ethics and Professional ethics.

UNIT - IV

Ethics in Management– II: Ethics in Finance: Insider trading -ethical investment - Ethical issues in Information Technology: Information Security and Threats – Intellectual Property Rights – Cyber crime

UNIT –V

Role of Corporate Culture in Business: Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics - Modern Ethical Models for Decision Making, Ethics for manager, ethics in business competition

TEXT BOOKS

1. Murthy CSV: *Business Ethics and Corporate Governance*, HPH, 2007
2. Dr. K. Nirmala, Karunakara Reddy: *Business Ethics and Corporate Governance*, HPH

REFERENCES

1. M.G. Velasquez, *Business Ethics*, Prentice Hall India Limited, New Delhi, 7TH Edition, 2012
2. Dr. K. Nirmala, Karunakara Reddy: *Business Ethics and Corporate Governance*, HPH
3. K. Venkataramana, *Corporate Governance*, SHBP, 2018

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(19CE0119) GEOTECHNICAL ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course

1. *Find index properties such as specific gravity, field density, Atterberg's limits and sieve analysis on soils to classify soils*
2. *Find the engineering properties such as permeability, maximum dry density and corresponding optimum moisture content, shear strength and CBR values of soils*

COURSE OUTCOMES (COs)

On successful the completion of this course, the student will be able to

1. *Conduct tests on fine grained soils to determine Atterberg's limits*
2. *Conduct fields test to find out field density of cohesive and cohesion less soils*
3. *Perform sieve analysis and sedimentation analysis to classify the soil*
4. *Conduct field tests on soil to estimate soil permeability*
5. *Conduct compaction test and draw compaction curve to find out optimum moisture content and maximum dry density*
6. *Conduct shear tests to predict shear strength of the soil*

LIST OF EXPERIMENTS

1. Specific gravity of soil solids
2. Atterberg's limits (liquid limit, plastic limit and shrinkage limit)
3. Field density test-Core cutter and Sand replacement method
4. Grain size distribution-Sieve analysis
5. Permeability of soil (constant and variable head method)
6. Compaction test
7. California bearing ratio test
8. Consolidation test
9. Unconfined compression test
10. Direct shear test

Any eight experiments may be conducted

TEXT BOOKS

1. K.V.S. Appa Rao & V.C.S. Rao, *Soil Testing Lab Manual*, University Science Press, Laxmi Publications, 2016
2. S.Mittal and J.P. Shukla, *Soil Testing for Engineers*, Khanna Publishers, Sixth Edition

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(19CE0120) CONCRETE & HIGHWAY MATERIALS LAB

COURSE OBJECTIVES

To conduct experiments on cement, fine aggregate, coarse aggregate, bitumen, fresh and hardened concrete to access various properties and quality parameters

COURSE OUTCOMES (COs)

After completion of this lab the student will be in position

1. *Find cement properties by conducting experiments*
2. *Evaluates properties of fine aggregates experimentally*
3. *Determine the crushing and impact strength of coarse aggregates*
4. *Determine the shape properties of coarse aggregate*
5. *Conduct experiments on fresh and hardened concrete*
6. *Conduct experiments on bitumen to access the grade and quality*

LIST OF EXPERIMENTS

I. CEMENT

1. Fineness and Specific gravity of cement
2. Normal Consistency, Initial and Final setting of cement
3. Soundness of cement

II. FINE AGGREGATE

4. Specific gravity of sand
5. Bulking of sand
6. Silt content in sand

III. COARSE AGGREGATE

7. Specific gravity of aggregate and water absorption of coarse aggregate
8. Aggregate impact value test
9. Aggregate crushing value test
10. Los Angles abrasion test
11. Flakiness and Elongation test

IV. CONCRETE

12. Workability test of concrete
    - Slump cone test
    - Compaction factor test
13. Compressive Strength of Concrete.

V. BITUMEN MATERIALS

14. Penetration Test

15. Ductility Test
16. Softening point Test

Any 10 experiments can be conducted by consider at least one experiment from each group.

REFERENCES

1. M.L. Gambhir, *Concrete Manual*, Dhanpat Rai & Co., Fourth edition.
2. Gambhir, *Building Construction and Materials (Lab Manual)*, TMH publishers.
3. S.K.Khanna and C.E.G Justo, *Highway Materials Testing Laboratory Manual*, New Chand Bros, Roorkee
4. Ajay.K.Duggal & Vijay.P.Puri, *Lab Manual on Highway Engineering*, New Age Publications, New Delhi
5. Relevant IS Code

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(19CE0121) SURVEYING CAMP (2 Weeks)

COURSE OBJECTIVES

1. *To impart intensive training in the use of training instrument.*
2. *To train the students to appreciate practical difficulties in surveying on the field.*
3. *To make the students to conversant with camp life.*
4. *Providing an opportunity to the students to develop the team spirit.*
5. *To train the students for self-management and to communicate with the local population.*

COURSE OUTCOMES (COs)

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

1. *Evaluation of filed area using triangulation*
2. *Developing contour maps for given terrain*
3. *Setting of simple curves using various methods*
4. *Determination of latitude and longitude from place of observation*
5. *Computation of longitude and cross section for a road earthwork estimation*
6. *Determination of coordinates of given plane area*

LIST OF EXPERIMENTS

1. Calculation of given area by using triangulation survey.
2. Drawing of contour maps using different methods.
3. Setting out of a curve by offset method.
4. Setting out a curve by single Theodolite method
5. Determination of longitude from the place of observation.
6. Determination of the latitude from the place of observation.
7. Computation of LS & CS of Road.
8. Determination of coordinates using Trilateration method.

REFERENCES

1. Kanetkar.T.P. & S.V. Kulkarni, Puna Vidyarthi Girha, Prakashan, *Surveying and levelling part I & II*, 23rd Edition
2. R. Subramanian, *Fundamentals of Surveying and Levelling*, Oxford University Press, India, 1st Edition
3. Arora K. R, *Surveying Vol-I*, Rajsons Publications Pvt. Ltd., 10th Edition,

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(19HS0858) HUMAN VALUES AND PROFESSIONAL ETHICS

COURSE OBJECTIVES

The Objective of the course is to

1. *Create awareness on Human Values.*
2. *Impart knowledge on an Engineering Ethics*
3. *Instill morality, accountability in an engineering experimentation*
4. *Create awareness on an assessment of safety, risk and rights*
5. *Develop knowledge on global issues*
6. *Create an awareness on Human Values and Engineering Ethics, Engineers social responsibility in an experimentation, appreciate the rights of others and ethics in global issues.*

COURSE OUTCOMES (COs)

On completion of the course the student will be able to

1. *Identify and analyze human values in their relevant field*
2. *Assess their own engineering ethics and have the social consciousness*
3. *Get knowledge on codes of ethics and on an utilitarian thinking*
4. *Identify safety, risks and an ethical concern in research and intellectual contexts*
5. *know necessity of computer and an environmental ethics, give a picture on weapons development*
6. *Upon completion of the course, the student should be able to apply the ethics in society, discuss an ethical issues related to engineering and realize the responsibilities and rights in the society*

UNIT I

Human Values: Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Necessity of Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics : Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III

Engineering as Social Experimentation: Engineering as Experimentation--Engineering Projects VS. Standard Experiments, Engineers as responsible Experimenters–Conscientiousness-

Comprehensive Perspective - Moral Autonomy - Accountability, Industrial Standards, Codes of Ethics – A Balanced Outlook on Law.

UNIT IV

Safety, Responsibilities and Rights: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk, Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V

Global Issues: Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

TEXTBOOKS

1. R S Nagarajan, *Professional Ethics and Human Values*, New Age International (P) Limited Publishers, 3rd Edition, 2006
2. M.Govindarajan, S.Natarajananad, V.S.SenthilKumar, *Engineering Ethics includes Human Values* -PHI Learning Pvt Ltd, 2nd Edition, 2009

REFERENCES

1. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, *Engineering Ethics – Concepts and Cases*, Cengage Learning, 2nd Edition, 2009
2. John R Boatright, *Ethics and the Conduct of Business*, Pearson Education, New Delhi, 1st Edition, 2003
3. Edmund G Seebauer and Robert L Barry, *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press, Oxford, 4th Edition, 2001
4. PSR Murthy, *Indian Culture, Values and Professional Ethics*, BS Publication, 2nd Edition, 2013

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III B.Tech – II Sem.

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(19CE0122) STRUCTURAL DESIGN

COURSE OBJECTIVES

The objectives of this course

1. *To learn the design methodologies for different RCC and steel structural members*
2. *To impart knowledge on the behaviour and design on various reinforced concrete structural elements*
3. *To make the student conversant with the design principles of steel structural elements as per IS Codal provisions*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Explain the Limit State of Collage and Serviceability and describe various design parameters*
2. *Design and Analysis of RCC singly, doubly and flanged beams*
3. *Design of RCC flexural members such as beams and slabs for various considerations*
4. *Design RCC columns and isolated footings*
5. *Describe and design various connections used in steel design*
6. *Design of steel compression, tension and flexural members*

UNIT – I

RCC structures: Concepts of Reinforced Concrete Design–Limit State Method–Material–Stress Vs Strain Curves for Concrete & Steel–Safety Factors–Characteristic Values–Stress Block Parameters – IS: 456 –2000

Beams: Limit State Analysis–Design of Singly Reinforced–Doubly Reinforced and Flanged Sections

Limit State of Serviceability: Limit State Design for Serviceability in Case of Deflection, Cracking and Codal Provision

UNIT – II

Design for Shear, Torsion & Bond: Limit State Analysis and Design of Section for Shear and Torsion– Concept of Bond

Design of RC Slabs: One way slab – Two way slab – Types of Staircases – Design of dog legged Staircase

UNIT – III

Design of RC Compression Members: Types of columns – Axially Loaded columns –Design of Uniaxial and biaxial bending

Design of RC Foundation: Design of isolated footing – Square footing

UNIT – IV

Steel Structures: Types of structural steel – Mechanical properties of steel – Concepts of plasticity – Yield strength - Loads and combinations of loading – Behaviour of steel, local buckling - Different Limit States as per IS 800-2007 – Design strengths – Serviceability
Connections: Bolted connections –Welded connections – Design Strength
Tension Members: Design strength of members - Design of tension members

UNIT – V

Design of Compression Members: Buckling class – Slenderness ratio – Strength design – Column Base - Slab base
Design of Beams: Simple and built-up beams – Laterally supported beams

TEXT BOOKS

1. Ashok K. Jain, *Reinforced Concrete (Limit State Design),* New Chand & Bros Publishers, 7th Edition, 2012
2. Duggal,S.K, *Limit State Design of Steel Structures,* McGraw-Hill Education, 2019

REFERENCES

1. Subramanian. N, *Design of Reinforced Concrete Structures,* Oxford University Press, 2014
2. Krishna Raju N, *Reinforced Concrete Design: IS: 456-2000 Principles and Practice,* New Age International Pvt Ltd Publishers, 2018
3. Devadoss Menon and Pillai S, *Reinforced Concrete Design,* McGraw Hill Education India Private Limited, 3rd edition, 2017
4. S.S. Bhavikatti, *Design of Steel Structures,* IK International Publication House, New Delhi, 2017
5. Subramanian, N, *Steel Structures - Design and Practice,* Oxford University Press, 2015

Codes/Tables

1. IS 456: 2000 Plain and Reinforced Concrete - Code of Practice
2. IS 800: 2007 General Constructions in Steel - Code of Practice
3. Steel table

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(19CE0123) HYDROLOGY & WATER RESOURCES ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *Understand the concept of hydrology and components of hydrologic cycle such as precipitation, infiltration, evaporation and transpiration*
2. *Quantify runoff and use concept of unit hydrograph*
3. *Demonstrate different methods of irrigation, methods of application of water and irrigation procedure*
4. *The fundamental idea behind this course is to make student aware of canal regulation works and cross drainage works*
5. *The course also targeted to teach students the concepts of major irrigation structures such as gravity dams, earthen dams and its prerequisites namely reservoir planning*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Explain importance of hydrology, hydrological cycle and estimate precipitation, runoff, evaporation, evapotranspiration and infiltration. Classify different type of geological formation of ground water and estimate yield*
2. *Classify various types of irrigation and describe principals of irrigation*
3. *Explain the principals of crop water requirements and determine the irrigation crop water requirements*
4. *Describe canal regulation works and design various elements in canal regulation works*
5. *Classify different types of cross drainage works and explain the concepts of reservoir planning*
6. *Classify various types of dams and estimate the stability of gravity of dam*

UNIT – I

Introduction to Hydrology: Engineering Hydrology and its applications; Hydrologic Cycle; Precipitation- Types and Forms; Evaporation- Factors affecting & measurement of Evaporation; Infiltration - Factors affecting & measurement of infiltration - Infiltration Indices; Run-off- Factors affecting Run-off - Computation of Run-off

Hydrograph Analysis: Hydrograph-Unit Hydrograph- Construction and limitations of Unit Hydrograph - Application of Unit Hydrograph - S-Hydrograph

UNIT – II

Ground Water: Aquifer – Aquiclude – Aquifuge - Aquifer parameters; Porosity - Specific yield - Specific retention; Types of aquifers - Well Hydraulics - Darcy's Law - Steady radial flow to a well; Dupuit's theory for confined and unconfined aquifers

Irrigation: Introduction - Necessity and importance of Irrigation - Advantages and effects of Irrigation - Types of Irrigation - Methods of Application of Irrigation water -Duty and Delta - Relation between Duty and Delta - Factors affecting Duty - Methods of improving Duty

UNIT – III

Water Requirement of Crops: Types of Soils; Gross Command Area - Culturable Command Area - Culturable Cultivated and Uncultivated Area; Kor Depth and Kor Period - Crop seasons and Crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Consumptive use of water - Factors affecting consumptive use

Canal Regulation Works: Canal falls- Necessity and location of falls- Types and classification of falls; Roughening devices; Design of sarada type fall; Canal regulators- Off take alignment- Head regulators and cross-regulators- Design of cross-regulator and distributary head regulator

UNIT – IV

Cross Drainage Works: Introduction - Types of cross drainage works - Selection of suitable type of cross drainage work - Classification of aqueducts and siphon aqueducts.

Reservoir Planning: Introduction - Investigations for reservoir planning- Selection of site or a reservoir- Zones of storage in a reservoir; Storage capacity and yield- Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Life of reservoir; Flood routing- Methods of flood routing Graphical Method (Inflow storage discharge curves method)

UNIT – V

Dams: Introduction- Classification according to use- Classification according to material- Gravity dams- Arch dams- Buttress dams- Steel dams- Timber dams- Earth dams and rock fill dams- Advantages and disadvantages- Physical factors governing selection of type of dam- Selection of site for a dam

Gravity Dams: Introduction- Forces acting on a gravity dam- Combination of loading for design- Modes of failure- Stability requirements- Principal and shear stresses- Stability analysis- Elementary profile of a gravity dam- Practical profile of a gravity dam- Limiting height of a gravity dam- High and low gravity dams- Design of gravity dams– Single step method- Galleries- Stability analysis of non-overflow section of Gravity dam

TEXT BOOKS

1. K Subramanya, *Engineering Hydrology*, McGraw Hill Publication, 4th Edition
2. Dr. B.C. Punmia, Dr. Pande Brij Basi Lal, Ashok Kumar Jain, Dr. Arun Kumar Jain, *Irrigation and Water Power Engineering*, Laxmi Publications,16th Edition

REFERENCES

1. Dr. P.N. Modi, *Irrigation Water Resources and Power Engineering*, Standard Book House, 9th Edition
2. Dr. P. Jaya Rami Reddy, *A Textbook of Hydrology*, Laxmi Publications, 3rd Edition

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(19CE0124) CONSTRUCTION PROJECT MANAGEMENT

COURSE OBJECTIVES

The objectives of this course

1. *To make the student understand various functionaries of the construction project management*
2. *To make the student work with construction project management tools such as bar charts, CMP & PERT*
3. *To gain the knowledge of material management, quality management, safety management and contracts in construction practice*

COURSE OUTCOMES (COs)

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

1. *Describe importance, types, phases, participants of construction projects and summarize functions of construction management*
2. *Develop bar chart, mile stone charts and can explain the basic principles of network techniques*
3. *Analyze PERT & CPM networks to find various time estimates and identify critical activities and path*
4. *Optimize the cost and can update CPM network*
5. *Discuss significance of material management and quality management of construction projects*
6. *Recognize various issues related to construction safety and can describe fundamentals of construction contracts*

UNIT – I

Construction Project: Importance of Construction – Indian Construction Industry – Types of Construction - Construction Project – Phases of Construction Project – Construction Project Management and its relevance – Participants of construction project – Functions of construction management

Construction Planning: Types of project plans – Work breakdown structure – Bar charts – Milestone Charts – Elements of Network – Development of Network – Difference between AoA and AoN diagram – Common errors in drawing the network

UNIT-II

PERT Network Analysis: Uncertainties – Time estimates – Frequency distribution – Earliest expected time – Latest allowable occurrence time – Slack – Critical Path

CPM Network Analysis: CPM process – CPM network – Activity time estimate – Earliest event time – Latest allowable occurrence time – Float – Critical activities and critical path

UNIT – III

CPM Cost Model: Project cost – Indirect project cost – Direct project cost – Slope of direct cost curve – Total project cost and optimum duration – Contracting the network for cost optimization – Steps in time cost optimization

CPM Updating: Updating Process – Data required for updating – Steps in the process of updating – When to update

Resources Allocation: Resources usage profiles – Resources smoothing – Resources levelling

UNIT – IV

Material Management: Material procurement – Material management functions – Inventory management

Quality Management: Construction quality – Inspection – Quality control – quality assurance in projects – Total quality management – Cost of quality – Audit

UNIT-V

Safety Management: Construction accidents – Causes – Prevention of accidents – Safety measures – Cost of accidents – Safety and health management systems

Construction Contract: Contract document – Classification of contracts – Bidding process – CPWD contract conditions

TEXT BOOKS

1. Kumar NeerajJha, *Construction Project Management – Theory and Practice*, Pearson Education India, 2011
2. Dr. B. C. Punmia & K. K. Khandelwal, *Project Planning and Control with PERT and CPM*, Lakshmi Publications New Delhi

REFERENCES

1. B Sengupta& H Guha, *Construction Management and Planning*, McGraw Hill Education (India) Private Limited, 1st edition, 2015
2. Saurabha Kumar Soni, *Construction Management and Equipment*, SK Kataria& Sons, 2014
3. Robert L. Peurifoy, William B. Ledbetter and Clifford J. Schexnayder, *Construction Planning, Equipment and Methods*, McGraw-Hill Higher Education, 6th Edition, 2001

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(19CE0125) ENVIRONMENTAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *To equip the students with the principles and design of water treatment units and distribution system*
2. *The objectives of this course is to help students to develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants*
3. *To develop a student's skill in evaluating the performance of water and wastewater treatment plants*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Forecast population, Estimate the water demand for a town or city during design period*
2. *Describe water quality criteria and standards, and their relation to public health*
3. *An ability to Design the various functional units in water treatment and distribution system*
4. *Estimate sewage generation and Design of sewer system*
5. *Recognize characteristics and composition of wastewater*
6. *Design of the unit operations and processes that are used in sewage treatment and sludge disposal*

UNIT – I

Introduction to Water Supply: Importance and Necessity of protected water supply system - Objectives of protected water supply system- Flow chart of public water supply system

Water Demand and Quantity Studies: Estimation of water demand for a town or city-Types of water demands- Percapita demand- Factors affecting the percapita demand-Variations in the Demand-Design period-Factors affecting the design period- Population studies-Methods of population forecasting - Sources of water - Surface and subsurface sources-Factors governing the selection of source of water

UNIT – II

Quality and Analysis of Water: Characteristics of water – Physical, Chemical and Biological - Analysis of water – Physical, Chemical and Biological- Water borne diseases- Drinking water quality standards.

Water Treatment: Layout and general outline of water treatment units –Screening-Types of screens – Sedimentation - Principles – Design factors – Coagulation-Methods of feeding coagulation – Flocculation - Filtration – Theory – Classification of filters –Comparison - Design of filters – Disinfection – Methods – Chlorination – Forms - Break point chlorination - Water Softening – Hardness – Types - Methods of removal of hardness

UNIT – III

Water Distribution: Distribution systems – Requirements-Methods of distribution- Layout of Water distribution systems - Waste detection and prevention – House service connection

Introduction to Sanitation: Sources of waste water generation- System of sanitation –Relative merits & demerits – Collection and conveyance of wastewater – Sewerage – Classification of sewerage systems

Estimation of Sewage Flow: Estimation of sewage flow and storm water drainage –DWF-Factors affecting DWF- Hydraulics of sewers and storm drains– Design of sewers – Materials for sewers- Appurtenances in sewerage – Cleaning and ventilation of sewers

UNIT – IV

Wastewater Characteristics: Characteristics of sewage – Physical, Chemical and Biological - Decomposition of sewage- Examination of sewage – Biological Oxygen Demand-Chemical Oxygen Demand

Wastewater Treatment: Layout and general outline of various units in a wastewater treatment plant–Primary treatment-Screens–Grit Chamber– Skimming tanks – Sedimentation tanks – Principles & design – Secondary treatment – Activated sludge process - Trickling filters – Standard and high rate trickling filters – Comparison

UNIT – V

Disposal of Sewage and Sludge Treatment: Methods of waste water disposal- Self-purification–Oxygen sag curve - Sludge treatment processes-Flow chart-Sludge thickening and digestion – Factors – Design of digestion tank

Disposal of Sludge: Sludge dewatering- Disposal of sludge – Methods - Septic tanks and Imhoff Tanks - Working principles and design – Soak pits and Dispersion trench

TEXT BOOKS

1. Garg, S.K., *Environmental Engineering Vol. I & II*, Khanna Publishers, New Delhi, 2015
2. Modi, P.N., *Water Supply & Waste Water Engineering, Vol. I & II*, Standard Book House, New Delhi, 2010

REFERENCES

1. Punmia, B.C., Jain, A.K., and Jain.A.K, *Water Supply & Waste Water Engineering, Vol. I & II*, Laxmi Publications, 2010
2. Duggal K.N., *Elements of Environmental Engineering*, S.Chand and Co. Ltd., New Delhi, 2014
3. Metcalf and Eddy, *Wastewater Engineering-Treatment and Reu*se, Tata McGraw-Hill Company, New Delhi, 2010
4. *Manual on Water Supply and Treatment*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999
5. *Manual on Sewerage and Sewage Treatment Systems Part A, B and C*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013

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(19EE0231) NEURAL NETWORKS AND FUZZY LOGIC

COURSE OBJECTIVES

Students undergoing this course are expected to:

1. *To introduce the basics of Neural Networks and essentials of Artificial Neural*
2. *Networks with Single Layer and Multilayer Feed Forward Networks.*
3. *To have knowledge on Associate Memories, Fuzzy sets and Fuzzy Logic system components.*
4. *To know Neural Network and Fuzzy Network system application to Electrical Engineering*
5. *The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand the basic concept of artificial neural networks*
2. *Understand different learning mechanism in artificial neural networks*
3. *Create Neural Network models for electrical engineering.*
4. *Understand the basic concepts of fuzzy sets.*
5. *Understand the basic concepts of fuzzy logic.*
6. *Create Fuzzy models for electrical engineering*

UNIT - I

Fundamentals Of Artificial Neural Networks : Neural networks -introduction, Organization of human brain, Biological neuron, artificial neuron,McCulloch-Pittsneuron model,Characteristics and Applications of artificial neural networks Architectures of artificial neural networks– activation functions,important terminologies of ANN, learning strategies-supervised,unsupervised, reinforced learning.

UNIT - II

Supervised Networks: Perceptron networks-Perceptron learning, Limitations of Perceptron, back propagation networks-architecture, Computations in each layer, Error calculation in Back propagation networks, Gradient descent method in learning, back propagation algorithm, learning factors - initial weights, leaning constant, momentum coefficient, Applications of Neural Networks to Electrical Engineering.

UNIT - III

Associative Memories: Introduction, Associative Memories- Auto associative Memory, BidirectionalAssociativeMemory(BAM), Architectures, Storage and Recall Phases, Recognition of noisy patterns, Hamming distance and Energy functions.Discrete Hopfield network architecture and storage and recall algorithm.

UNIT - IV

Classical And Fuzzy Sets: Introduction to classicalsets - properties –Fuzzyvscrsip Fuzzysets, Membership functions, basic fuzzyset operation,propertiesoffuzzysets-Fuzzyrelations–FuzzyCartesianproduct,operations on fuzzy relations.

UNIT -V

Fuzzy Logic Systems: Fuzzification–Fuzzy quantifiers, fuzzy inference ,fuzzyrule based system-development of rule base and decision making system-Defuzzification to crispsets-Fuzzification and Defuzzification methods. Applications of Fuzzy logic systems in Electrical Engineering.

TEXT BOOKS

1. Rajasekaran, G.A. Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic, and Genetic Algorithms Synthesis and Applications by* S. PHI, 2012

2. S.N. Sivanandam, S.N. Deepa, *Principles of Soft computing by* WileyIndia private Ltd., 2nd Edition, 2013

REFERENCES

1. Timothy J Ross, *Fuzzy Logic with Engineering Application*, McGraw Hill Inc.1997

2. Jacek M. Zurada, *Introduction to Artificial Neural Networks* Jaico Publishing House

3. Simon Haykin, *Neural Networks - A Comprehensive Foundation, Prentice*- Hall Inc, 1999

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(19ME0353) COMPUTER AIDED PROCESS PLANNING

COURSE OBJECTIVES

The objectives of this course is to

1. *Provide the student with an understanding of the importance of process planning role in manufacturing.*
2. *Classify the various methods of CAPP*
3. *Understand the importance of product development through CIMS, shop floor control, Computer Integrated Manufacturing and Automation*
4. *Understands about NC, CNC and DNC systems.*
5. *Know about capacity Planning, Adaptive control machining systems, FMS and MRP's*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Know the importance of process planning role in manufacturing*
2. *Describe the various methods of CAPP*
3. *Recognize the importance of product development through CIMS, shop floor control, Computer Integrated Manufacturing and Automation*
4. *Gain the knowledge about NC, CNC and DNC systems.*
5. *Identify about capacity Planning, Adaptive control machining systems*
6. *Familiar in FMS and MRP I and MRP II*

UNIT- I

Introduction to Process Planning: Role of process planning in the manufacturing cycle- Information requirement for process planning system - Merits of conventional process planning over CAPP - Structure of automated process planning system, features recognition, methods.

UNIT- II

Generative CAPP System: Importance - Generative CAPP system - Automation of logical decisions - Knowledge based systems - Inference Engine, implementation, benefits.

Retrieval CAPP System: Significance - Retrieval CAPP system, structure, relative advantages and disadvantages- implementation and applications.

UNIT- III

Implementation Techniques for CAPP: MIPLAN system - The Bottom-up approach - The Top-Down approach - Computer programming languages for CAPP- Criteria for selecting a CAPP system - Benefits of CAPP - MRP - I, MRP - II and benefits.

UNIT- IV

Computer Integrated Production Planning: Capacity planning- shop floor control- MRP-I, MRP-II- CIMS benefits.

Computer Integrated Manufacturing System (CIMS): Introduction to CIMS, Automation strategies, Automation and CAD/CAM, Scope of CIM- Computer controls in NC- NC, CNC and DNC systems, components, block diagram, applications- Part programming- Group technology, benefits.

UNIT- V

Flexible Manufacturing systems (FMS): Components of FMS, workstation, Material handling system and computer control system, FMS Layout configurations and benefits of FMS.

Adaptive control machining systems: Introduction to adaptive control machining systems, application- approaches, adaptive control optimization system, adaptive control constraint system, applications to machining processes, computer process monitoring and computer process control.

TEXT BOOKS

1. Mikel P.Groover, *Automation, Production systems and Computer Integrated Manufacturing Systems,* Pearson Higher Education, Inc., 4th Edition, 2015.
2. Dr. Sadhu Singh, *Computer Aided Design and Manufacturing*, Khanna Publishers, 2009.

REFERENCES

1. Gideon Halevi and Roland D. Weill, *Principles of Process Planning,* A logical approach, Chapman & Hall, 1995.
2. Chang T C and Richard A Wysk, An *Introduction to Automated Process Planning Systems*, Prentice Hall, 1985
3. H.P. Wang and J.K. Li, *Computer Aided Process Planning*, Elsevier Science and Technology Publishers, 1st edition, 1991.

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(19EC0451) MATLAB PROGRAMMING

COURSE OBJECTIVES

The objectives of this course:

1. Understand the MATLAB Desktop, Command window and the Graph Window
2. Be able to do simple and complex calculation using MATLAB
3. Understand the mathematical concepts upon which numerical methods
4. Understand the tools that are essential in solving engineering problems

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. *Analyze and visualize data effectively by using MATLAB.*
2. *Apply numeric techniques and computer simulations to solve engineering-related problems.*
3. *Apply a top-down, modular, and systematic approach to design, write, test, and debug sequential MATLAB programs to achieve computational objectives.*
4. *Design and document computer programs and analyses in a careful and complete manner so as to effectively communicate results, to facilitate evaluation and debugging by another programmer, and to anticipate and resolve user errors.*
5. *Demonstrate understanding and use of fundamental data structures (classes).*
6. *Create and control simple plot and user-interface graphics objects in MATLAB.*

UNIT-I

Introduction To MAT LAB: MATLAB Interactive Sessions, Menus and the toolbar, computing with MAT LAB, Script files and the Editor Debugger, MATLAB Help System, Programming in MAT LAB.

UNIT-II

Arrays: Arrays, Multidimensional Arrays, Element by Element Operations, Polynomial Operations Using Arrays, Cell Arrays, Structure Arrays.

UNIT-III

Functions & Files: Elementary Mathematical Functions, User Defined Functions, Advanced Function Programming, Working with Data Files.

UNIT-IV

Programming Techniques: Program Design and Development, Relational Operators and Logical Variables, Logical Operators and Functions, Conditional Statements, Loops, the Switch Structure, Debugging MATLAB Programs

Plotting: XY- plotting functions, Subplots and Overlay plots, Special Plot types, Interactive plotting, Function Discovery, Regression, 3-D plots

UNIT-V

Linear Algebraic Equations: Elementary Solution Methods, Matrix Methods for Linear Equations, Cramer Method, Undetermined Systems, Order Systems.

TEXT BOOKS

1. G. H. Golub and C. F. Van Loan, *Matrix Computations*, Johns Hopkins University Press, 3rd Edition, 1996.
2. B. N. Datta, *Numerical Linear Algebra and Applications,* Brooks/Cole, 1994 (out of print)

REFERENCES

1. William J Palm, *Introduction to MATLAB for Engineers*, 3rd edition, McGraw Hill
2. L.Elden, *Matrix Methods in Data Mining and Pattern Recognition*, SIAM Press, 2007
3. Amos Gilat, *MAT LAB: An Introduction with Applications*, WILEY, 4th edition

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(19CS0546) INTRODUCTION TO CYBER SECURITY

COURSE OBJECTIVES

The Objectives of this Course

1. *To understand the fundamentals of cybercrime and the cyber offenses.*
2. *To learn the concepts of cyber threats and cyber security.*
3. *To familiarize various cyber threats, attacks, vulnerabilities, defensive mechanisms, security policies and practices.*

COURSE OUTCOMES (COs)

On successful completion of the course Students will able to

1. *Know fundamentals of cybercrimes.*
2. *Analyze the cyber offenses.*
3. *Realize the cyber threats, attacks, vulnerabilities and its defensive mechanism.*
4. *Understand the Tools and Methods Used in Cybercrime.*
5. *Design suitable security policies for the given requirements.*
6. *Explore the industry practices and tools to be on par with the recent trends.*

UNIT- I

Introduction to Cybercrime: Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT - II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, and Cloud Computing.

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones.

UNIT IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

Cyber Security: Organizational Implications Introduction, Cost of Cybercrimes and IPR issues,

Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOKS

1. Nina Godbole and Sunil Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley India

REFERENCES

1. James Graham, Richard Howard and Ryan Otson, *Cyber Security Essentials*, CRC Press
2. Chwan-Hwa(john) Wu,J.David Irwin, *Introduction to Cyber Security*, CRC Press T&F Group

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(19HS0862) STRATEGIC MANAGEMENT

COURSE OBJECTIVES

1. *To introduce the basic knowledge of concepts underlying in strategic management, its process*
2. *To provide an insight to the tools and techniques used in analyzing and choosing strategies*
3. *To make them learn the principles of strategy formulation, implementation, evaluation and control of strategy*

COURSE OUTCOMES (COs)

After the completion of course Students will be able to:

1. *Describe major theoretical concepts, background work and research output in the field of strategic management.*
2. *Develop an understanding of the strategic management process and the functional strategies*
3. *Conduct analysis using various tools and frameworks to make strategic decisions*
4. *Explain the basic concepts, principles and practices associated with strategy formulation and implementation*
5. *Analyze various strategies and explore appropriate strategic implementation at business and corporate levels*
6. *Analyze and evaluate critically real life company situations and develop creative solutions, using a strategic management perspective*

UNIT I

Introduction to Strategic Management – Definition, significance and components- Strategic Management as a process –Developing a strategic vision, Mission, Objectives, Policies, Environmental Scanning

UNIT II

Strategic Analysis and Choice: Tools and techniques- Porter's Five Forces Model -BCG Matrix, GE Model, TOWS Matrix, Mc Kinsey 7'S framework - Organisation Analysis – VRIO frame work, Value Chain Analysis.

UNIT III

Strategy Formulation: - Formulation of strategy at corporate and business level -Strategy Alternatives-Stability Strategy, Growth Strategy, Retrenchment Strategy, and Combination Strategy.

UNIT IV

Strategy Implementation: Types of Strategies: Offensive strategy, Defensive strategy, vertical integration, horizontal strategy- Strategy and Leadership - Organization Structure - Resource Allocation as a vital part of strategy - Management of Change

UNIT V

Strategy Evaluation and Control – Establishing strategic controls - Role of the strategist - benchmarking to evaluate performance - strategic information systems – Guidelines for proper control- -strategic audit - Strategy and Corporate Evaluation and feedback in the Indian context.

TEXT BOOKS

1. P. SubbaRao, Strategic *Management*, Himalaya, 2010
2. AzarKazmi, *Strategic Management and Business Policy*, Tata McGraw Hill Education, 2009

REFERENCES

1. V.S.P. Rao, *Strategic Management – Text and Cases*, Excel books, 2009
2. Fred R. David, *Strategic Management A competitive approach Concepts and Cases*, Pearson, 16th edition, 2019
3. R. Srinivasan, *Strategic Management: the Indian context*, 5th edition, PHI, 2014
4. N.Chandrasekharan. PS Ananthanarayanan, *Strategic Management*, Oxford publications, 2011
5. Charles L Hill, *Strategic Management an Integrated approach*, Cengage learning, 10th Edition, 2007

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(19CE0126) ENVIRONMENTAL ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course

1. *The laboratory provides knowledge of estimating various parameters like pH, Chlorides, Hardness and Alkalinity in water*
2. *For effective water treatment, the determination of optimum dosage of coagulant and chloride demand is also included*
3. *The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD of effluent*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Describe and use the water and wastewater sampling procedures and sample preservations*
2. *Conduct the physical tests on drinking water and compare the result with standards*
3. *Perform the test on drinking water to estimate various chemical constituents*
4. *Conduct test on drinking water to access biological contamination*
5. *Perform the total solids test to estimate the level of contamination of waste water*
6. *Decide the optimal coagulant dose required to treat water*

LIST OF EXPERIMENTS

1. Determination of pH
2. Determination of Conductivity
3. Determination of Acidity of Water
4. Determination of Alkalinity of Water
5. Determination of Chlorides
6. Determination of Hardness of Water
7. Determination of Residual Chlorine
8. Determination of Dissolved Oxygen
9. Determination of Biochemical Oxygen Demand
10. Conducting Jar test for determining optimum dosage of coagulant
11. Determination of Total Solids, Total Dissolved Solids &Settle able Solids

Any eight experiments may be conducted

TEXT BOOKS

1. Sawyer, C.N., McCarty, P.L. & Parkin, G.F., *Chemistry for Environmental Engineering,* McGraw Hill India, Fifth Edition,2017
2. Mathur, R.P, *Water & Wastewater Testing Lab Manual*, Roorkee

REFERENCES

1. *Standard Methods for the Examination of Water and Wastewater*, A.P.H.A., American Public Health Association
2. Lab Manual, *ISO 14001 Environmental Management*, Regulatory Standards for Drinking Water and Sewage disposal
3. Dr.G. Kotaiah and Dr.N. Kumara Swamy, *Environmental Engineering Lab Manual*, Charotar Publishers, Anand

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(19CE0127) COMPUTER AIDED DESIGN LAB

COURSE OBJECTIVES

1. To understand software skills regarding analysis and design.
2. To understand the scope of STAADPRO software
3. To understand to analyze and design frames, trusses and slabs.

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *List and discuss various basic commands of STAADPRO or Equivalent.*
2. *Discuss the software skills regarding analysis and design.*
3. *Analyze and Design any 2-D & 3-D Framed Structures.*
4. *Analyze and Design of One -Way Slab & Two-Way Slab.*
5. *Discuss the Retaining Wall and its Analysis & Design.*
6. *Analyze and Design of Multistoried Building & Overhead Tank.*

LIST OF EXPERIMENTS

1. 2-DFrameAnalysisandDesign
2. 3-DFrameAnalysisandDesign
3. Steel Tabular Truss Analysis and Design
4. Retaining Wall Analysis and Design
5. One -Way Slab Analysis &Design
6. Two-Way Slab Analysis & Design
7. Column Analysis & Design
8. Design of Overhead Tank
9. Analysis of Multistoried Building
10. Design of Multistoried Building

Any eight experiments may be conducted

Software Required:

1. STAADPRO or Equivalent

TEXTBOOKS

1. Sesha Prakash, M.N.and C.S. Suresh, *Computer Aided Design Lab Manual*

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(19CE0128) VIRTUAL LAB IN CIVIL ENGINEERING

COURSE OBJECTIVES

1. *To introduce student to virtual lab environment*

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. *Conduct Brinell Hardness Test, Rockwell Hardness Test and Vickers Hardness test on the same metal and report different hardness values.*
2. *Study Fatigue and Creep test in virtual labs and report observations*
3. *Reynold's Experiment and give observations on different types of flows*
4. *Find out bursting pressure of a pipe*
5. *Conduct BOD & COD test in virtual environment on wastewater sample.*
6. *Determine optimum dose of Alum*

LIST OF EXPERIMENTS

Following experiments are conducted in virtual environment:

1. Brinell, Rockwell and Vickers Hardness Tests
2. Fatigue and Creep Tests
3. Reynold's Experiment
4. Bursting of Pipe
5. BOD & COD Tests
6. Optimum Dose of Alum

REFERENCES

1. Virtual Labs - Civil Engineering (vlab.co.in)

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(19HS0859) ENGLISH FOR CORPORATE COMMUNICATION SKILLS LAB

COURSE OBJECTIVES

1. To improve the students' fluency in English, through a well-developed vocabulary
2. To enable them listening spoken English at normal conversational speed by English speakers
3. To respond appropriately in different social-cultural and professional contexts
4. To develop drafting skills among the students.
5. To develop Inter-personal and Intra-personal Skills

COURSE OUTCOMES (COs)

1. Use fluency in English for all kinds of professional communication
2. Enhancing job required skills for getting success in their professions
3. Improving Effective Speaking Abilities for their business or professional correspondence
4. Prepare effective Interview techniques to get job in the present scenario
5. Using the appropriate skills in all kinds of professional activities
6. Use effective communicative approaches by preparing job application, report and other kinds of spoken and written correspondences.

UNIT I
COMMUNICATIVE COMPETENCY

1. Functional English
2. Reading Comprehension
3. Vocabulary for competitive purpose
4. Spotting Errors

UNIT II
TECHNICAL WRITING

5. Cover Letter
6. Curriculum vitae
7. Report writing

UNIT III
PRESENTATIONAL SKILLS

8. Impromptu Speech
9. Oral presentation
10. Power point presentation
11. Poster presentation

UNIT IV
CORPORATE SKILLS

12. Problem Solving
13. Team Work
14. Leadership Skills

UNIT V

GETTING READY FOR JOB

15. Group Discussion
16. Interview skills

Minimum requirements for English for Corporate Communication Skills Lab

1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.
2. English for Corporate Communication Skills Lab with movable chairs and audio visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.

System Requirement (Hardware component):

Computer network, LAN with minimum 60 multimedia systems with the following

Specifications

i) a) Intel(R) core (TM) i3
   b) Speed 3.10 GHZ
   c) RAM – 4 GB
   d) Hard Disk – 320 GB

ii) Headphones with High quality

Software

- Walden Info Tech Software

REFERENCES

1. Rizvi, *Effective Tech Communication*, Tata McGraw Hill Education, 2007
2. Sanjay Kumar & Pushpalatha, *Communication skills,* Oxford University Press, 2012
3. Writing Tutor. *Advanced English Learners'* Dictionary, Oxford University Press, 9th Edition, 2015
4. Anjana Agarwal, *Powerful Vocabulary Builder*, New Age International Publishers, 2011
5. Miles Craven, *Listening Extra*, Cambridge University Press, 2008

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(19HS0812) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES

1. *To familiarize the students with the concepts of microeconomics and make them understand the concept of demand and supply analysis in business applications*
2. *To understand the pricing and output decisions under different market structures*
3. *To understand the basic financial statements and techniques of financial statement analysis*

COURSE OUTCOMES (COs)

After the completion of the course student would be able to:

1. *Understand the nature of managerial economics and the role of it in business firms*
2. *Identify the determinants of demand and apply cost analysis under different market conditions*
3. *Integrate the concepts of price and output decisions of business firms*
4. *Appreciate the importance of market structures and implement appropriate price and output decisions*
5. *Assess the financial statements of a firm and the financial performance of the firm through the financial statements*
6. *Measure operating, investing and financial performance of a firm*

UNIT-I

Introduction to Managerial Economics: Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants- Law of Demand - Elasticity of Demand. Significance –Types – measurement of elasticity of demand - Demand forecasting- factors governing demand Forecasting- methods of demand forecasting – Relationship of Managerial Economics with Financial Accounting and Management.

UNIT-II

Theory of Production and Cost Analysis: Production Function – Short-run and long- run production - Isoquants and Isocosts, MRTS, least cost Combination of inputs - Cobb-Douglas production function - laws of returns - Internal and External Economies of scale .

Cost Analysis: Cost concepts - Break-Even Analysis (BEA) – Managerial Significance and limitations of BEA - Determination of Break Even Point (Simple Problems).

UNIT-III

Introduction to Markets and New Economic Environment: Market structures: Types of Markets - Perfect and Imperfect Competition - Features, Oligopoly -Monopolistic competition. Price-Output determination - Pricing Methods and Strategies - New Economic Environment- Economic systems – Economic Liberalization – Privatization and Globalization

UNIT-IV

Capital and Capital Budgeting: Concept of Capital - Over and under capitalization – Remedial

measures - Sources of Short term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital Budgeting proposals – Methods and Evaluation of Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT-V

Introduction to Financial Accounting and Analysis: Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping-Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account –Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

TEXT BOOKS

1. Aryasri, *Managerial Economics and Financial Analysis,* TMH, 4th edition, 2009
2. Varshney & Maheswari, *Managerial Economics,* Sultan Chand, 2009

REFERENCES

1. Premchand Babu, Madan Mohan, *Financial Accounting and Analysis*, Himalaya, 2009
2. S.A. Siddiqui and A.S. Siddiqui, *Managerial Economics and Financial Analysis*, New Age International, 2009
3. Pearson Joseph G. Nellis and David Parker, *Principles of Business Economics*, 2nd edition, New Delhi
4. Domnick Salvatore, *Managerial Economics in a Global Economy*, Cengage, 2009
5. H.L.Ahuja, *Managerial Economics*, S.Chand, 3rd edition, 2009

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(19CE0130) FOUNDATION ENGINEERING

COURSE OBJECTIVES

To make the student understand

1. *Bearing capacity and settlement of shallow foundations.*
2. *The concepts involved in computing lateral earth pressures on retaining walls.*
3. *The load-carrying capacity of pile foundations and settlement of pile groups.*
4. *The well foundation and construction aspects of caisson foundation.*
5. *The General Criteria for design of machine foundations and vibration analysis.*

COURSE OUTCOMES (COs)

At the end of the course the student will able to

1. *Describe different earth pressures and calculate active and passive earth pressures using Rankine's theory,* Coulomb's theory and graphical techniques.
2. *Establish the stability of retaining walls.*
3. *Discuss various theories on bearing capacity and field tests and apply them to estimate the bearing capacity of soils and conduct settlement analysis.*
4. *Classify various types of pile foundation, analyze the load carrying capacity of pile and pile groups.*
5. *Classify various shapes and components of wells and analyze, and understand design and construction* aspects of Caissons.
6. *Classify various types of pile walls, and design of anchors.*

UNIT – I

Earth Pressure Theories: Introduction – Plastic Equilibrium in Soils – Active and Passive States – Earth Pressure at Rest– Rankine's Theory – Coulomb's Wedge Theory – Culmann's and Rebhann's Graphical Methods for Active Earth Pressure.

Retaining Walls: Types of retaining walls – Stability Consideration for Gravity Retaining Walls.

UNIT – II

Shallow Foundations: Types and choice of foundation – Depth of foundation – Types of shear failures – safe bearing capacity – Terzaghi's analysis – Meyerhof's analysis – Skempton's analysis – IS Method – Bearing Capacity from Standard Penetration Test –Effect of water table on bearing capacity - Plate load test.

Settlement: Types of settlement – Tolerable settlements – Allowable soil pressure for both cohesion less and cohesive soils.

UNIT – III

Pile Foundations: Necessity – Classification – Load carrying capacity of piles – Static methods – Dynamic formulae – In-situ penetration tests – pile load tests – Negative skin friction – Group action in piles – Settlement of pile groups.

UNIT – IV

Well Foundations: Introduction–Types – Different shapes of wells – Forces Acting on Wells - Components of wells – Grip length – Design Criteria – Sinking of wells – Measures for Rectification of Tilts and Shifts.

Caisson Foundation: Introduction – Design Aspects of Caissons –Types of caissons – Construction Aspects of Caissons.

UNIT- V

Sheet Pile Walls: Types of sheet pile walls– Free Cantilever sheet pile– Cantilever sheet pile in Cohesionless Soils– Cantilever sheet pile in penetrating clay– Anchored sheet pile with free Earth support– Rowe's Moment Reduction curves– Anchored sheet pile with fixed Earth support– Design of Anchors– Illustrative Examples– Problems.

TEXTBOOKS

1. K.R. Arora, *Soil Mechanics and Foundation Engineering,* Standard Publishers.
2. C. Venkataramaiah, *Geotechnical Engineering,* New Age International Pvt Ltd.

REFERENCES

1. V.N.S. Murthy, *Geotechnical Engineering,* CRC Press, New York, Special Indian Edition.
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation* Laxmi Publications Pvt Ltd., New Delhi, 16th Edition, 2005.
3. Joseph E. Bowles, P.E., S.E., *Foundation Analysis and Design,* McGraw-Hill Companies New york, 5th Edition,1997.

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(19CE0131) CONCRETE TECHNOLOGY

COURSE OBJECTIVES

1. *To know the physical and chemical properties of cement and admixtures.*
2. *To understand the basic behaviour of concrete, its application in varied environment, help them to handle the material on site*
3. *To give basic and essential knowledge to graduate students about concrete as well as latest developments in concrete technology*
4. *Enrich the practical knowledge on mix design principles, concepts and methods.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Describe various properties of cement and aggregates*
2. *Conduct tests on hardened concrete*
3. *Understand the influence of creep and shrinkage on performance of concrete*
4. *Evaluate the strength of hardened concrete using various NDT methods*
5. *Observe the significance of durability of concrete while designing a concrete mixes*
6. *Design concrete mixes for the intended grades*

UNIT – I

Cements & Admixtures: Portland Cement – Chemical Composition – Hydration, Setting of Cement – Structure of Hydrated Cement –Different Types of Cement – Grades of cement – Mechanical Strength of Cement Gel - Water Held In Hydrate Cement Paste – Heat of Hydration Of Cement – Influence of Compound Composition on Properties of Cement - Admixtures.

Aggregates:- : Classification of Aggregate – Particle Shape and Texture – Bond Strength & Other Mechanical Properties of Aggregate – Specific Gravity, Bulk Density, Porosity, Absorption & Moisture Content of Aggregate – Soundness of Aggregate – Deleterious Substance in Aggregate-Alkali Aggregate Reaction – Thermal Properties – Sieve Analysis – Fineness Modulus –Grading Curves – Grading of Fine & Coarse Aggregates – Gap Graded Aggregate - Bulking of Sand

UNIT – II

Hardened Concrete: Water / Cement Ratio – Abram's Law – Gel Space Ratio –Strength of Concrete – Maturity Concept – Strength in Tension & Compression – Compression Tests – Tension Tests — Flexure Tests – Splitting Tests – Relation Between Compressive & Tensile Strength-Factors Affecting Strength-Curing Methods.

UNIT – III

Elasticity, Creep & Shrinkage: Modulus of Elasticity – Dynamic Modulus of Elasticity – Poisson's Ratio – Creep of Concrete – Factors Influencing Creep – Relation Between Creep & Time– Nature of Creep – Effects of Creep & Shrinkage – Types of Shrinkages.

Non-Destructive Testing Methods: Introduction to Non-Destructive Testing Methods – Rebound Hammer – Ultra Pulse Velocity Method – Pullout - Profometer - Codal Provisions for NDT

UNIT – IV

Permeability and Durability: Permeability – Sulphate attack – Methods of controlling Sulphate attack– Attack of sea water – Acid attack – Chloride attack – Corrosion of steel – Corrosion control – Deterioration of concrete by Abrasion, Erosion and Cavitation – Effects of some Materials on Durability – Surface treatment of Concrete.

UNIT – V

Mix Design: Durability of Concrete – Quality Control of Concrete – Factors Considered in Mix Proportions – Statistical Methods of Mix Design – Acceptance Criteria – Proportioning of Concrete Mixes by ACI & IS10262 Methods.

TEXTBOOKS

1. M.L.Gambhir, *Concrete Technology,* Tata McGraw-Hill Publishers, New Delhi
2. M.S. Shetty, *Concrete Technology,* S. Chand & Co

REFERENCES

1. A.M. Neville, *Properties of Concrete,* Pearson Publication, 4th edition
2. P.K.Mehta and J.M.Monteiro, *Concrete: Microstructure, Properties and Materials*, McGrawHill Publishers
3. Krishna Raju, *Design of Concrete Mix,* CBS Publishers
4. J.Prasad & C.G.K.Nair, *Non Destructive Test and Evaluation of Materials,* McGraw-Hill Publishers, New Delhi

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(19CE0138) FINITE ELEMENT METHOD
(Professional Elective Course (PEC-I)

COURSE OBJECTIVES

1. *To equip the fundamental concepts of finite element methods.*
2. *To learn the theory and characteristics of finite elements that represent engineering structure.*
3. *To ascertain and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analysis.*

COURSE OUTCOMES (COs)

Students undergoing this course are able to

1. *Exemplifies the fundaments needed for carrying FEM analysis.*
2. *Develop finite element formulations of 1D& 2D problems.*
3. *Compute the shape functions for different elements.*
4. *Solve the complex problems using plane stress and plane strain analysis.*
5. *Solve the problems of bars and trusses using element stiffness matrix.*
6. *Formulate Isoperimetric elements with different irregular boundaries and Comprehend the concept behind Axi-symmetric analysis.*

UNIT –I

Introduction: Concepts of FEM – Steps Involved – Merits & Demerits – Energy Principles – Discretization – Rayleigh-Ritz Method of Functional Approximation

Principles of Elasticity: Equilibrium Equations – Strain Displacement - Relationships in Matrix Form – Constitutive Relationships for Plane Stress, Plane Strain and Axi-Symmetric Bodies of Revolution with Axi-Symmetric Loading

UNIT –II

One Dimensional & Two Dimensional Elements: Stiffness matrix for bar element – shape functions – 1D and 2D elements – types of elements for plane stress and plane strain analysis – Displacement models – Generalized coordinates — Natural coordinate system – area and volume coordinates.

UNIT - III

Shape Functions: Introduction - Polynomial Shape Functions – Convergence Requirements; Compatibility Requirement of Shape Functions – Shape Function for Different Elements - Derivation of Shape Functions Using Polynomials - Finding Shape Functions Using Lagrange Polynomials - Shape Functions for Serendipity Family Elements

UNIT - IV

Bars and Trusses: Introduction – Generation of Element Stiffness Matrix - Tension Bars/Columns - Two Dimensional Trusses – Numerical Problems

Plane-Stress and Plane-Strain Analysis: Introduction – Generation of Element Stiffness Matrix - Solving Plane Stress and Plane-Strain Problems Using Constant Strain Triangle Page

UNIT – V

Isoparametric Formulation: Concepts of Isoparametric Elements for 2D Analysis – Formulation of CST Element, 4–Noded and 8-Noded Iso-Parametric Quadrilateral Elements – Lagrangian and Serendipity Elements

Axi-Symmetric Analysis: Basic principles - Formulation of 4-noded Iso-parametric Axi - Symmetric Element.

TEXT BOOKS

1. S.S. Bhavakatti, *Finite Element A*nalysis, New Age International Publishers.
2. T R Chandrupatla and A D, *Introduction to Finite Element in Engineering*, Belegundu University Press, India.

REFERENCES

1. Dr.S.Senthil and R. Panneerdhass, *Finite Element Analysis,* Lakshmi Publications, Chennai.
2. Robert D. Cook, *Concepts and Applications of Finite Element Analysis*, Malkus and Michael E. Plesha. John Wiley & Sons.
3. Krishnamurthy, *Finite Element Analysis (Theory and Programming),* Tata McGraw Hill Co. Ltd. New Delhi.
4. David V Hutton, *Finite Element Analysis*, Tata McGraw Hill, New Delhi.

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(19CE0139) ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT
(Professional Elective Course (PEC-I)

COURSE OBJECTIVES

The objectives of this course

1. *Can understand various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same.*
2. *Can understand the Assessment of Impact on Vegetation and Wildlife.*
3. *Can understand about of various environmental acts to protect environment.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Perform a critical quality review of an EIA*
2. *Structure the EIA working process considering the need for interdisciplinary.*
3. *Perform the screening and scoping of an EIA, based on existing requirements, evaluate the impacts and draw meaningful conclusions from the results of the EIA.*
4. *Describe the various Developmental Activities of EIA and its impacts on land use, surface water environment & Air environment.*
5. *Understand the general principles of ecology, noise environment and its impact analysis.*
6. *Describe the various environmental protection acts implement in India.*

UNIT – I

Introduction: Basic concept of EIA-Salient Features of EIA , EIA Procedure - Defining the Scope of EIA- Identification of Impacts on the Environment by Preliminary Overview Assessment -Classification and Prediction of Impacts - Impact Evaluation and Analysis - preparation of Environmental Base map -Classification of environmental parameters - Preparation of an EIA Report.

UNIT-II

EIA Methodologies: Introduction, Criteria for the selection of EIA Methodology, EIA methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT – III

Impact of Developmental Activities and Land Use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures

EIA in Surface Water: Methodology for the assessment of Impacts on surface water environment.

Prediction and Assessment of Impacts on the Air Environment: Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT – IV

Assessment of Impact on Vegetation and Wildlife: Introduction**:** Assessment of Impact of development Activities on Vegetation and wildlife, Impact analysis, Loss of valuable vegetation community types, direct loss of wild life - Mitigation.

Prediction and Assessment of Impacts of Noise on the Environment : Introduction - Basic Information of Noise- Noise Measurement- Effects of Noise of People- Systematic Methodology for Assessing Environmental Impacts of Noise.

UNIT – V

Environmental Acts (Protection and Prevention): The Environmental Protection Act, The Water Act, The Air (Prevention & Control of pollution Act.), Wild life Act, ISO and the Concept, ISO 14001

EIA Case Studies: Introduction- Environmental Impact of Industrial Development -Factors to be considered in Making Assessment Decisions- Preparation of TOR - Management Requirements for the Preparation of EIA for industrial projects, Preparation of EIA of Land Clearing Projects.

TEXT BOOKS

1. Y. Anjaneyulu, *Environmental Impact Assessment Methodologies*, by, B.S.Publication, Sultan Bazar, Hyderabad, 2nd Edition, 2017
2. J. Glynn and Gary W. Hein Ke, *Environmental Science and Engineering*, Prentice Hall Publishers, 2nd Edition, 1996

REFERENCES

1. Suresh K. Dhaneja, *Environmental Science and Engineering*, S.K., Katari& Sons Publication, New Delhi, 3rd Edition, 2008
2. John G. Rau and David C. Wooten (Ed), *Environmental Impact Analysis Handbook*, McGraw Hill Book Company
3. Dr H.S. Bhatia, *Environmental Pollution and Control*, Galgotia Publication (P) Ltd, Delhi, 2nd Edition. 2003

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(19CE0140) MAINTENANCE & REHABILITATION OF STRUCTURES
(Professional Elective Course (PEC-I)

COURSE OBJECTIVES

The objectives of this course

1. *Learn the fundamentals of maintenance and repair strategies*
2. *Know the causes of corrosion, Mechanism and prevention*
3. *Study the quality assurance, serviceability and durability of concrete*
4. *Educate the different repair, strengthening, rehabilitation and retrofitting techniques*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Describe the fundamentals of maintenance and repair strategies*
2. *Describe the Quality Assurance* for *various structural members*
3. *Explain the causes of corrosion and its prevention*
4. *Describe the Diagnosis and Assessment of Distress for structural members*
5. *Know the materials and techniques used for repair of structures*
6. *Carry out inspection and Strengthening of damaged structure*

UNIT – I

Maintenance and Repair Strategies: Maintenance – Repair and Rehabilitation – Facets of Maintenance – importance of Maintenance – Various aspects of Inspection – Assessment procedure for evaluating a damaged structure – causes of deterioration.

Serviceability and Durability of Structures: Quality Assurance for concrete construction – Fresh concrete properties – Strength – Permeability – Cracking – Effects due to climate – Temperature – chemicals – Design and construction errors.

UNIT – II

Corrosion of Steel Reinforcement: Corrosion mechanism - Effects of cover thickness and cracking - Methods of corrosion Protection – Inhibitors - Coatings - Cathodic protection.

UNIT – III

Diagnosis and Assessment of Distress: Diagnosis and Assessment of Distress - Visual inspection – Non-destructive tests – Ultrasonic pulse velocity method – Rebound hammer technique –Pull out tests – Core test.

UNIT – IV

Materials for Repair: Materials for Repair – Special concretes and mortar – Concrete chemicals – Special elements for accelerated strength gain – Expansive cement – Polymer concrete – Ferro cement, Fibre reinforced concrete – Fibre reinforced plastics.

UNIT – V

Rehabilitation of Structures: Strengthening of Structural elements–Repair of structures distressed due to corrosion, fire, Leakage, earthquake – Demolition Techniques –Engineered demolition methods – Case studies.

TEXT BOOKS

1. Bhattacharjee, *Concrete Structures Repair Rehabilitation and Retrofitting,* CBS, First edition, 2019
2. Shetty, M.S., *Concrete Technology Theory and Practice,* S.Chand and company, New Delhi,2018

REFERENCES

1. B.L. Gupta and Amit Gupta, *Maintenance and Repair of Civil Structures,* Standard Publications, New Delhi, 2010
2. P.C.Varghese, *Maintenance Repair & Rehabilitation & Minor Works of Bridges,* PHI Learning Pvt. Ltd, 2014
3. A.R. Santhakumar, *Concrete Technology*, Oxford University Press, New Delhi, 2018
4. *Handbook on Repair and Rehabilitation of RCC buildings,* CPWD, Government of India, 2002

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(19CE0141) ADVANCED STRUCTURAL DESIGN
(Professional Elective Course (PEC-II)

COURSE OBJECTIVES

The objectives of this course

1. *Familiarize Students with different types of Connections and relevant IS codes*
2. *Equip student with concepts of design of Flat slabs, water tanks, retaining walls, plate girder and gantry girder.*

COURSE OUTCOMES (COs)

The successful completion of this course, the students will be able to

1. *Analyse and design flat slabs for the given building dimensions.*
2. *Design circular and rectangular water tanks.*
3. *Detail the reinforcing bars for retaining walls for horizontal back fill.*
4. *Analyse and design plate girder*
5. *Analyse and design gantry girder*
6. *Design the structure for stability, strength and serviceability*

UNIT – I

Analysis and Design of a flat slab (Interior panel only)

UNIT – II

Analysis and Design of circular and rectangular water tank resting on the ground

UNIT – III

Analysis and Design of cantilever and counter fort retaining wall with horizontal back fill

UNIT – IV

Analysis and Design of a Plate girder

UNIT – V

Analysis and Design of a Gantry girder

TEXT BOOKS

1. Krishna Raju, *Structural Design and Drawing (RCC and Steel),* Universities .Press, New Delhi.
2. Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, *R.C.C Structures*, Laxmi Publications, New Delhi.

REFERENCES

1. Varghese, *Advanced RCC*, PHI Publications, New Delhi.
2. M.L.Gambhir, *Design of RCC structures*, P.H.I. Publications, New Delhi.
3. S.S.Bhavikatti, *Design of Steel Structures: By Limit State Method as per IS: 800-2007*, I.K.International Publishing House Pvt Ltd., New Delhi, 3rd Edition.
4. S.K.Duggal, *Limit State Design of Steel Structures*, Tata McGraw Hill Publications, 1st Edition.

IS Codes:

1. IS 456-2000
2. IS 800 – 2007

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(19CE0142) AIRPORT PLANNING AND DESIGN
(Professional Elective Course (PEC-II)

COURSE OBJECTIVES
The objectives of this course
1. *To familiarize with Airport planning issues along with the designing of runways*
2. *To learn the various aspects of structural design of Airport pavements*
3. *To understand visual aids and necessary inputs required for Airport grading and drainage*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to
1. *Collect vital data required for planning of an airport by conducting various surveys and can prepare various drawings*
2. *Classify various types of airports*
3. *Design features and various geometric elements pertaining to runways*
4. *Design various types of airport pavements*
5. *Recognize the importance of various visual aids such as airport marking and lighting*
6. *Design various surface and sub-surface drainage systems for an airport*

UNIT – I
Airport Planning: General- Regional Planning- Data Required before Site Selection- Airport Site Selection- Surveys for Site Selection- Drawings to be prepared- Estimation of Future Air Traffic Needs

UNIT – II
Runway Design: Runway Orientation- Basic Runway Length- Corrections for Elevation, Temperature and Gradient- Airport Classification- Runway Geometric Design- Airport Capacity- Runway Configurations- Runway Intersection Design

UNIT – III
Structural Design of Airport Pavements: Introduction- Various Design Factors- Design Methods for Flexible Pavement- Design Methods for Rigid Pavement- LCN System of Pavement Design- Joints in Cement Concrete Pavement- Airport Pavement Overlays- Design of an Overlay

UNIT – IV
Geometric Design of Runways and Taxiways: Aircraft characteristics – Influence of Characteristics on Airport Planning and Design – Geometric Design Elements of Runway – Standards and Specifications – Functions of Taxiways – Taxiway Geometric Design – Geometric Elements and Standard Specifications – Runway and Taxiway Lighting.

UNIT – V

Airport Grading And Drainage: General- Computation of Earthwork- Airport Drainage- Special Characteristics and Requirements of Airport Drainage- Design Data- Surface Drainage Design Subsurface Drainage Design

TEXT BOOKS

1. S.K.Khanna, M.G.Arora and S.S.Jain, *Airport Planning and Design*, Nem Chand & Bros, 6th edition, 2009
2. Dr. L. R. Kadyali, Dr. N. B. Lal, *A Text Book of Principle and practices of Highway Engineering including Expressways and Airport Engineering*, Khanna Publications,7th edition, 2013.

REFERENCES

1. Rangwala SC, *Airport Engineering,* Charotar Publishing House Pvt. Ltd., 17th edition, 2019
2. Dr. S. K. Sharma, *Highway Engineering including Airport Pavements*
3. Virendra Kumar, *Air Transportation Planning and Design*
4. Subash C Saxena, *Airport Engineering: Planning & Design*

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IV B.Tech – I Sem.

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(19CE0143) FUNDAMENTALS OF URBAN PLANNING
(Professional Elective Course (PEC-II)

COURSE OBJECTIVES
The objectives of this course:
1. *To understand the concept of town planning by ensuring that new and existing facilities are complimentary to each other*
2. *To understand about bye-laws implemented in towns and cities.*
3. *To create awareness about the traffic management within the town.*

COURSE OUTCOMES (COs)
On successful completion of this course, students will be able to
1. *Recognize issues related to town planning and discuss the objectives, necessity and stages of town planning*
2. *Summarize importance of zoning, can classify various town planning practices and can conduct surveys for town planning*
3. *Classify the residential building, list the agencies involved in improving house and review the problems associated with residential housing*
4. *Discuss the issues associated with slums and recognize the methods to improve condition of slums*
5. *Interpret norms laid down for public and industrial building and can summarize building bye-laws*
6. *List and discuss various urban roads and the concepts of traffic management in a town*

UNIT – I
Introduction to Town Planning: Objects of town planning – Necessity of town planning – Principles of town planning – Origin and growth of towns – Stages in Town Development – Development of towns – Town Planning in Ancient India – Planning of Modern towns & Military towns – Selection of site for an ideal town – Cost of town planning –Introduction to smart cities.

UNIT – II
Surveys & Planning: Necessity of surveys – Various types of surveys to be conducted for town planning project – Data to be collected in different types of town planning survey – Uses of surveys –Drawing & Reports from surveys – Forms of Planning.
Zoning: Definition – Objects and principles of zoning – Importance of zoning – Classification of various zones – Transition zone – Advantages of zoning – A brief note on Special Economic Zone (SEZ).

UNIT – III

Housing: Importance of housing – Requirements &Classification of residential building – National Housing policy – Various housing agencies involved in housing – Investment in Housing – Housing Problems in India.

Slums: Causes of slums– Characteristics – Effects – Slum clearance and re-housing –Works of improvement – Open Plot Scheme – Prevention of slum formation.

UNIT – IV

Public Buildings & Industries: Classification – Location – Design Principles of public building – Grouping of public buildings – Classification of industries – Requirements of an industry – Regulation of their location – Treatment of Industrial wastages.

Building Bye-Laws: Importance of bye-laws – Function of local authority – Applicability of bye-laws – Principles underlying building bye-laws – Setbacks – Floor Space Index

UNIT – V

Urban Roads: Objects& Requirements – Classification – Types of street systems – Through and bypass roads – Outer and inner ring roads – Expressways – Freeways.

Traffic Management: Objects– Traffic surveys – Traffic congestion – Parking – Road accidents – Traffic capacity of roads – Road intersections – Traffic islands – Roundabouts – Grade separation– Traffic signals – Road signs – Road markings – Street lighting in a town – Applications of Drones in Smart Cities.

TEXT BOOKS

1. Rangwala, *Town Planning*, Charotar Publishing, 30th edition, 2018.
2. G K Hiraskar, *Fundamentals of Town Planning*, Dhanpat Rai Publications, New Delhi, 17th edition, 2018.

REFERENCES

1. Abir bandyopadhyay, *A Text Book of Town Planning*, Books & Allied (P) Ltd, 2000.
2. Peter Hall and Mark Tewdwr-Jones, *Urban and Regional Planning*, Routledge Publications, 5th edition, 2010.
3. Catanese A J, *Urban Planning*, McGraw Hill Publications, 2nd edition, 2014.

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(19CE0144) DESIGN & DRAWING OF IRRIGATION STRUCTURES
(Professional Elective Course (PEC-III)

COURSE OBJECTIVES

The objectives of this course:

1. *To study the different aspects of design of hydraulic structures.*
2. *To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works.*
3. *To draw the various components of irrigation structures.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Estimate the flood discharge for various irrigation structures*
2. *Perform hydraulic design of various components of irrigation structures such as abutment, wing walls*
3. *Estimate various forces acting on the different components of hydraulic structures*
4. *Conduct stability analysis on various components of hydraulic structures*
5. *Design protective structures such as apron, talus etc.*
6. *Develop and draw various views of irrigation structures*

UNIT – I

Design and Drawing of Trapezoidal notch fall.

UNIT – II

Design and Drawing of Surplus Weir

UNIT – III

Design and Drawing of Tank Sluice with a Tower Head

UNIT – IV

Design and Drawing of Syphon Type-III Aqueduct

UNIT – V

Design and Drawing of Canal Regulator

FINAL EXAMINATION PATTERN: Any ***Two*** questions of the above ***Five*** designs may be asked out of which the student has to answer ***One*** question. The duration of examination is three hours.

TEXTBOOKS

1. Satya Narayana Murthy Challa, *Water Resources Engineering Principles and Practice*, New Age International Publishers, Revised Second Edition, 2002.
2. Santosh Kumar Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, Nineteenth Revised Edition, 2005.

REFERENCES

1. B.C. Punmia and Pande B.B. Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi,16th Edition, 2009.
2. G. L. Asawa, *Irrigation and Water Resources Engineering*, New Age International Publishers, 2006.

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(19CE0145) TRAFFIC ENGINEERING AND MANAGEMENT
(Professional Elective Course (PEC-III)

COURSE OBJECTIVES

The objectives of this course

1. *To give an overview of traffic engineering, various surveys to be conducted, traffic Regulation, management and traffic safety*
2. *To make students understand the concept of traffic regulation and safety.*
3. *To develop a strong knowledge of traffic planning and its management in any transportation area.*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *Determine various characteristics and standards adopted in a traffic system.*
2. *Carry out traffic surveys, highway capacity and level of service analysis*
3. *Design a traffic signals and suitable regulatory measures to meet an efficient traffic system.*
4. *Implement appropriate methods to ensure safety of the road users.*
5. *Recall the environmental issues related to traffic system.*
6. *Explain the concept of traffic management measures in addressing the demand, pricing and its applications.*

UNIT – I

Traffic Engineering and Function: Definition – Traffic Engineering – Functions – Organisations of the Traffic Engineering Department – Importance of Traffic Engineering under Indian conditions – Human factors Governing Road user Behaviour – Power performance of vehicles – other vehicle characteristics – Deceleration of vehicle costing – Characteristics of slow moving Traffic in India.

UNIT – II

Highway Capacity: General Importance of Capacity in Highway Transportation Studies – Early Capacity studies and theoretically derived formulae – Historical Perspective – Passenger car units – Capacity of uninterrupted flow conditions in the HCM Manual – Level of service concept in HCM Manual – Factors Affecting Capacity and level of service – Capacity of Freeways and Express ways in the rural Areas – Capacity of Two Lane and Multi lane Rural Highways, without Access control - Capacity of Urban Streets and rotary Intersection –HCM and IRC Standards.

UNIT – III

Traffic Controls: Importance and General Principles of Traffic Signing – Types of Traffic Signs - Road Markings – Function and Types of Road markings – General Principles of Longitudinal Pavement – Traffic signals – Advantages and Disadvantages of Traffic Signals – Signal

indications – Signal face – Determination of Optimum cycle length and signal settings for an intersection with fixed time signals – warrants for signals – Signal Approach Dimensions – Area Traffic Control – Delay at signalised Intersections.

UNIT – IV

Parking Studies and Traffic Safety: Types of parking facilities – on street parking and off street Parking facilities; Parking Studies and analysis. Accident studies and analysis: Causes of accidents - The Road, The Vehicle, The road user and the Environment; Engineering, Enforcement and Education measures for the prevention of accidents.

UNIT – V

Traffic Regulations and Management: Basic Principles of Regulation – Regulation of Speed, Vehicles, Concerning the Driver, Traffic – General Rules Concerning Traffic – Parking Regulations – Enforcement of Regulations – Travel Demand Management – Traffic Management.

TEXT BOOKS

1. Kadiyali.L.R., *Traffic Engineering and Transport Planning*, Khanna Publishers, Delhi, 2018
2. Garber and Hoel, *Principles of Traffic and Highway Engineering*, CENGAGE Learning India Pvt Ltd, Noida, New Delhi, 2010.

REFERENCES

1. Rogu P. Roess, Elena S. Prassas and William R. Mc Shane, *Traffic Engineering*, Pearson India Education Services Pvt. Ltd.
2. Partha Chakroborty and Animesh Das, *Principles of Transportation Engineering*, PHI Learning Pvt. Ltd., 2011.
3. John E Tyworth, *Traffic Management Planning, Operations and Control*, Addison Wesly Publishing Company, 1996
4. Hobbs.F.D., *Traffic Planning and Engineering*, University of Birmingham, Pergamum Press Ltd, 2005
5. Taylor MAP and Young W, *Traffic Analysis* – New Technology and New Solutions, Hargreen Publishing Company, 1998

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(19CE0146) PRESTRESSED CONCRETE
(Professional Elective Course (PEC-III)

COURSE OBJECTIVES
The objective of this course is
1. *Familiarize students with concepts of prestressing.*
2. *Equip student with different systems and devices used in prestressing.*
3. *Understand the different losses of prestress including short and long-term losses.*

COURSE OUTCOMES (COs)
On completion of the course, the students will be able to:
1. *Describe the historic development and methods of prestressing.*
2. *Estimate the losses of prestressing.*
3. *Analyze and design prestressed concrete beams under flexure resistance.*
4. *Design of prestressed members for shear and torsion.*
5. *Describe the concepts related to transfer of prestress in pre-tensioned members.*
6. *Describe the basic concepts and principles of prestressed concrete structures.*

UNIT I
Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing - Materials- high strength concrete and high tensile steel & their characteristics. Methods and Systems of prestressing: Pretensioning and Post tensioning methods and systems of prestressing (Hoyer, Freyssinet and Udall System).

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

UNIT III
Design for Flexural Resistance: Analysis of beams for flexure - beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons - Types of flexural failure – Code procedures- Design of sections for flexure - Control of deflections- Factors influencing deflections - Prediction of short term and long term deflections.

UNITIV
Design for Shear and Torsion: Shear and Principal Stresses – Design of Shear reinforcements – Pre-stressed concrete members in torsion - Design for Torsion - Codal Provisions, Design for Combined bending, shear and torsion.

UNIT V

Transfer of Prestress in Pre-Tensioned Members: Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

TEXTBOOKS

1. N.Krishna Raju, *Prestressed Concrete,* Tata McGraw Hill Book Education Pvt. Ltd, 5th Edition.
2. G.S. Pandit and S.P. Gupta, *Prestressed Concrete,* CBS Publishers and distributors

REFERENCES

1. T.Y.Linand Burn, *Design of Prestress Concrete Structures,* John Wiley, New York.
2. S. Ramamrutham, *Prestressed Concrete,* Dhanpat Rai& Sons, Delhi.
3. N.Rajagopalan, *Prestressed Concrete*, Narosa Publishing House.