With effect from the Academic Year 2019-20 (R-17)

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

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

Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad

SYLLABUS BOOK FOR
B.E (CIVIL) V and VI SEMESTER
UNDER CBCS WITH EFFECT FROM 2019–2020
(For the students admitted in 2017-18)

DEPARTMENT OF CIVIL ENGINEERING
+91-40-23146010, 23146011
Fax: +91-40-23146090
Website: www.vce.ac.in

DEPARTMENT MISSION

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

DEPARTMENT VISION

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-17)
B.E. – CIVIL ENGINEERING : FIFTH SEMESTER (2019 - 2020)

Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
HS510EH	Finishing School–III : Soft Skills	1	-	-	2	40	30	1
PC510CE	Reinforced Concrete Design – I	3	-	-	3	60	40	3
PC520CE	Theory of Structures-I	3	-	-	3	60	40	3
PC530CE	Fluid Mechanics – II	3	-	-	3	60	40	3
PC540CE	Soil Mechanics	3	-	-	3	60	40	3
PC550CE	Environmental Engineering	3	-	-	3	60	40	3
OE5XXXX	Open Elective – IV	3	-	-	3	60	40	3
MC040EH	Human Values & Professional Ethics-II	1	-	-	2	40	30	1
MC510CE	Finishing School–III : Technical Skills	1	-	-	2	40	30	1
PRACTICALS								
PC531CE	Hydraulics & Hydraulics Machinery Lab	-	-	2	3	50	30	1
PC541CE	Soil Mechanics Lab	-	-	2	3	50	30	1
PC551CE	Concrete Technology Lab	-	-	2	3	50	30	1
PW519CE	Mini Project : Surveying Camp	-	-	-	0	0	30	1
Student should acquire one online certificate course during III-VIII Semester								
TOTAL		**21**	**-**	**6**		**630**	**450**	**25**
GRAND TOTAL		**27**				**1080**		
Note: The left over hours are to be allotted to ECA-III / CCA-III / CC / RC / TC based on the requirement .								

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
9-5-81, Ibrahimbagh, Hyderbad-500031, Telangana State

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
FINISHING SCHOOL - SOFT SKILLS III

SYLLABUS FOR BE V SEMESTER

L:T:P(Hrs/Week): 2:0:0	SEE Marks : 30	Course Code: **U19HS510EH**
Credits: 1	CIE Marks : 40	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
This is a foundation course and aims at enhancing employability skills in students.	**At the end of the course students will be able to:**
1. Students will be introduced to higher order thinking skills and problem solving on the following areas - Arithmetic ability, Numerical ability and General reasoning. 2. Students will be trained to work systematically with speed and accuracy while problem solving.	1. Solve questions on the above mentioned areas using short cuts and smart methods. 2. Understand the fundamentals concept of Aptitude skills. 3. Perform calculations with speed and accuracy.

UNIT 1 QUANTITATIVE APTITUDE - NUMERICAL ABILITY

- Introduction to higher order thinking skills
- Speed Math
- Number systems
- LCM & HCF

UNIT 2 QUANTITATIVE APTITUDE- ARITHMETIC ABILITY FOUNDATION

- Ratio proportions
- Partnership
- Ages
- Allegations and mixtures

- Averages

UNIT 3 QUANTITATIVE APTITUDE

- Percentages
- Profit and loss

UNIT 4 REASONING ABILITY- GENERAL REASONING PART 1

- Blood Relations
- Number Series
- Coding and decoding

UNIT 5QUANTITATIVE APTITUDE

- Time and Work
- Chain Rule
- Pipes and Cisterns

Learning Resources:

1.scoremore.talentsprint.com

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
REINFORCED CONCRETE DESIGN-I

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: **PC510CE**
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to introduce	Upon the completion of the course, students are expected to
1. Design philosophies of working stress method and limit state method. 2. Indian standard codes of practice for Reinforced Concrete 3. Design of concrete structural elements using limit state method as per Indian code of practice.	1. Understand design philosophies of concrete and design beams for flexure with working stress method according to IS: 456 -2000. 2. Design beams for flexure with limit state method according to IS: 456-2000. 3. Design beams for shear, torsion and compute deflections with limit state design philosophy according to IS: 456-2000. 4. Perform yield line analysis of slabs and design slabs with limit state method according to IS: 456-2000. 5. Design columns and footings with limit state method according to IS: 456-2000.

UNIT-I: Introduction to Reinforced Cement Concrete: Need for Reinforcement in Concrete – Basic requirements of an RCC Structure-stability, strength, serviceability and durability.

Design Philosophies: Design philosophies- Working stress method (WSM) and limit state method (LSM) relative merits and demerits.

Working stress method: Theory of flexure in RCC beams, Balanced, under-reinforced and over reinforced sections; Analysis and design of singly and doubly reinforced rectangular sections.

UNIT-II: Basic concepts and terminology of LSM: Basic concepts and terminology of LSM - limit state, characteristic loads and strengths, Partial safety factors. Stress strain relationship for concrete and reinforcing steel; stress blocks.

Limit State of collapse in flexure: Assumptions, Analysis for flexure, failure in tension and compression, singly reinforced, doubly reinforced rectangular and flanged beams. Anchorage and development length, Curtailment of reinforcement in beams.

UNIT-III: Limit State of collapse in shear and torsion: Analysis and design for shear and torsion.

Limit State of Serviceability: Check for deflection and cracking.

UNIT-IV: Analysis and design of slabs: Types of slabs-one way, two way simply supported and continuous rectangular slabs subjected to uniformly distributed loads. Design of solid rectangular slabs.

Introduction to Yield line Theory for Slabs: Assumptions – Patterns of Yield lines – Analysis and design of a simply supported rectangular two- way slab using yield line approach.

UNIT-V: Analysis and design of columns: Assumptions, axially loaded circular, square and rectangular columns, Uniaxial and biaxial bending-interaction diagrams.

Design of Footings: Design of isolated square and rectangular footings as per IS code.

Learning Resources:

1. Unnikrishna Pillai S and Devdas Menon, “Reinforced Concrete Design”, McGraw Hill

Education India Pvt Ltd.,2009.
2. Varghese P.C, "Limit State Design of Reinforced Concrete", Prentice Hall of India, 2008.
3. Subramanian N., "Design of Reinforced Concrete Structures", Oxford University Press, 2013.
4. Robert Park and Thomas Paulay, "Reinforced Concrete structure", Wiley India Pvt. Ltd, 2013.
5. Shah H.J., "Reinforced Concrete", Vol.1, Charotar Publishing House, 2012.
6. Punmia B.C., Ashok K. Jain, Arun K. Jain, "Limit State Design of Reinforced Concrete", Laxmi Publications (P) Ltd. ,2012.
7. Ramamrutham, "Design of Reinforced Concrete Structures", Dhanpat Rai Publishing Co., 2015.
8. Nptel.ac.in/courses/105105105, Design of Reinforced Concrete Structures.
9. IS:456-2000, Code of Practice for Plain and Reinforced concrete, Bureau of Indian Standards, New Delhi, India.
10. SP 16: Design Aids for Reinforced Concrete to IS 456:1978, Bureau of Indian Standards, New Delhi, India
11. SP 24: Explanatory Handbook on Indian Standard Code of Practice for Plain and Reinforced Concrete to IS 456:1978, Bureau of Indian Standards, New Delhi, India
12. SP 34: Handbook on Concrete Reinforcement and Detailing (With Amendment 1), Bureau of Indian Standards, New Delhi, India
13. IS: 875-1987 Code of Practice For Design Loads (Other Than Earthquake) For Buildings And Structures Parts (1, 2, 3, 4 & 5), Bureau of Indian Standards, New Delhi, India

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

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

DEPARTMENT OF CIVIL ENGINEERING
THEORY OF STRUCTURES - I

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: **PC520CE**
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Explain methods of analysis for indeterminate beams, portal frames, arches and trusses 2. Describe analysis of beams and pin jointed frames using strain energy methods 3. Explain approximate methods of analysis for lateral loads	1. Find degree of indeterminacy of various structures subjected to external forces. 2. Perform analysis of beams and rigid jointed frames subjected to external loads using moment distribution method & slope deflection method and draw bending moment diagrams. 3. Analyse indeterminate structures subjected to external loads using Kani's method and draw bending moment diagrams 4. Analyse three hinged, two hinged parabolic arches carrying vertical loads and frames subjected to lateral loads and draw bending moment diagrams. 5. Apply strain energy methods in the analysis of beams and pin jointed frames subjected to external forces.

UNIT-I: **Static and Kinematic indeterminacy**: Determination of static and kinematic indeterminacy of beams, pin jointed and rigid jointed frames. Introduction to analysis by force method and displacement method.

Moment distribution method: Slope deflection equations, Analysis of continuous beams with and without sinking of supports, single bay single storey portal frames with and without side sway - loading on beam/portal frame shall be point load(s) and uniformly distributed load- shear force and bending moment diagrams.

UNIT-II: Slope deflection method: Analysis of continuous beams with and without sinking of supports, single bay single storey portal frames with and without side sway - loading on beam/portal frame shall be point load(s) and uniformly distributed load- shear force and bending moment diagrams.

UNIT-III: Kani's method: Analysis of continuous beams with and without sinking of supports, single bay single storey portal frames with and without side sway - loading on beam/portal frame shall be point load(s) and uniformly distributed load- shear force and bending moment diagrams.

UNIT-IV: Approximate methods: Portal method and cantilever method.

Analysis of arches: Three hinged and two hinged parabolic arches, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading.

UNIT-V: Strain energy methods: Determination of displacements using unit load method for statically determinate structures such as beams, pin-jointed trusses.

Redundant pin jointed trusses: Analysis of plane trusses with one degree of redundancy (internal / external), lack of fit and temperature effects.

Learning Resources:

1. Vazirani V.N., Ratwani M.M, Duggal S.K., "Analysis of Structures - Vol. II Theory, Design and Details of Structures", Khanna Publishers, 16th Edition, 2015.
2. Thandavamoorthy T.S., "Structural Analysis", Oxford Higher Education, Second Edition, 2012.
3. Ramamrutham S., Narayan R., "Theory of Structures", Dhanpath Rai publications, 2014
4. Devdas Menon, "Structural Analysis", 1st Edition, Narosa Book Distributors Pvt Ltd,2014.

5. Reddy C.S., "Basic Structural Analysis", 3rd Edition, Mc Graw Hill, 2010.
6. Junarkar S.B., Shah, “Mechanics of Structures”, Volume II, Charotar Pub. House, 2010.
7. Chu-Kia Wang, “Intermediate Structural Analysis (English) 1st Edition”, McGraw Hill Education, 2010.
8. Hibbeler R.C., “Structural Analysis”, 8/E, Prentice Hall, Higher Education, 2012.
9. Louis F. Geschwindner, Harry H. West, "Fundamentals of Structural Analysis", 2nd Edition, Wiley India Pvt. Ltd., 2011.
10. Stephen P. Timoshenko and Donovan H. Young “ Theory of Structures” McGraw Hill International Edition, 1968
11. http://nptel.ac.in/downloads/105101085/

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

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
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Duration of Internal Tests : 90 Minutes

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
FLUID MECHANICS – II

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: **PC530CE**
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Study various aspects of open channel flow. 2. Learn the concepts of boundary layer theory 3. Discuss the performance and design of hydraulic turbines and centrifugal pump.	1. Compute velocity, specific energy and critical depth in steady uniform flow through open channels 2. Determine water surface profiles, hydraulic jumps and surges in non uniform flow through open channels 3. Explain growth and separation of boundary layer and evaluate drag & lift forces for various shapes of bodies in a medium 4. Evaluate the performance characteristics and perform design of turbines for various conditions of head, discharges and power 5. Evaluate the performance characteristics and perform design of centrifugal pump for various conditions of head, discharges and power

UNIT-I: Steady uniform flow through open channels: Descriptions and definitions, difference between pipe flow and channel flow, velocity and pressure distribution in channel cross section, energy and momentum correction coefficients, friction to flow in open channel, uniform flow, Manning's and Chezy's formulae, most efficient channel cross-section, specific energy, concept and applications of critical depth.

UNIT-II: Gradually varied flow: Significance of Froude Number, dynamic equation of gradually varied flow, classification of gradually varied flow profiles, computation of flow profiles and characteristics of flow profiles. Hydraulic Jump- Momentum equation for a jump in horizontal rectangular channel, energy dissipation in hydraulic jumps and surges in open channels, elementary surge analysis.

UNIT-III: Boundary layer: Boundary layer growth and separation, methods to control separation, drag and lift forces, drag on airfoil and sphere, Principle of stream lining. Displacement, energy & momentum thickness stream lined body and bluff body, magnus effect.

UNIT-IV: Hydraulic Turbines: Classification, specific speed, unit quantities velocity triangles and principles of design of Pelton wheel turbine, Francis turbine and Kaplan turbine, characteristics curves cavitation in turbines .

UNIT-V: Centrifugal Pump: Component, work done, heads and efficiencies, minimum starting speed, specific speed and characteristics curves of centrifugal pump.

Learning Resources:

1. Modi P.N., Seth S.M., "Fluid Mechanics", Standard Book House, 2013
2. Bansal R.K., "Fluid Mechanics & Hydraulic Machinery", Laxmi Publications, 2015
3. Rama Durgaiah D., "Fluid Mechanics and Machinery" New Age International Publishers, 2002
4. Ojha C.S.P., Brendtsson R., Chandramouli P.N., "Fluid Mechanics and Machinery", Oxford University Press, 2010.
5. Ven Te Chow "Open - Channel Hydraulics" International Student Edition, McGraw-Hill, 2009.
6. http://nptel.ac.in/courses/105107059/, Fluid Mechanics
7. http://nptel.ac.in/courses/105103096/3, Hydraulics

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
SOIL MECHANICS

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: **PC540CE**
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to introduce	Upon the completion of the course, students are expected to
1. Study Origin, classification of soils and estimate index and engineering properties by different procedures 2. Learn Concepts of compaction and consolidation of soils 3. Estimate shear strength parameters, earth pressure and analyze stability of different slopes	1. Interpret composition and structure of soils and classify them according to IS Soil classification. 2. Evaluate effective stress under Hydrostatic Conditions, Steady State One-Dimensional Flow and Transient Hydrodynamic Conditions using analytical approach. 3. Compute stress distribution and analyze mechanisms of compaction and consolidation of soils under given field conditions. 4. Determine and judge shear strength in soils under given field conditions. 5. Evaluate lateral earth pressure using Rankine's and Columb's wedge theories and assess stability slopes in soils under given field conditions.

UNIT-I: Introduction and clay chemistry: – Brief history of discipline, Soil formation, structure of soils, composition and structure of clay minerals, clay-water interaction

Soil phase relationships pseudo-elastic three phase particulate medium, Mass-volume & weight-volume relationships and determination of specific gravity and water content.

Index properties: Shape and size characterization- Grain size distribution analysis including wet analysis-hydrometer analysis, Atterberg limits and consistency indices, Soil classification systems.

UNIT-II: Effective stress: Effective stress principle, Fundamentals of Effective stress under hydrostatic condition, distribution of stress with depth influence of shifting water table, shift in ground surface and capillarity. Functional relation between effective stress and engineering properties.

Permeability of Soils: Validity of Darcy's Law - Factors affecting permeability – Field and laboratory tests to determine permeability- Equivalent permeability of stratified soils.

Effective stress under one dimensional flow – seepage force, downward flow, upward flow, Quick Sand phenomena- Remedial measures. Laplace equation, qualitative representation of flownets under defined boundary conditions- Locating phreatic line in a homogeneous earthen dam using Kozeny's parabola – computation of seepage quantity, total, effective and neutral stress.

UNIT-III: Stress Distribution : Boussinesq's and Westergaard's equations for point load. Application of point load formulae for uniformly distributed load on circular and rectangular areas. Use of Newmark's chart (for Boussinesq's equation). Contact pressure distribution.

Compaction Process: Compaction Mechanism; factors affecting compaction. Determination of compaction characteristics - standard and modified Proctor tests - Light and Heavy compaction tests.CBR test – Field and laboratory based.

Consolidation Process: Spring analogy - Void ratio and effective stress (e Vs log P) relationship – Terazaghi's theory of one dimensional consolidation - assumptions and derivation of one dimensional consolidation equation, computation of magnitude of settlement and time rate of settlement.

UNIT-IV: Shear Strength: Significance of Shear strength in soils – Mohr-Coulomb equation – shear parameters - Determination of shear strength – Direct shear test, large shear box test Tri-axial compression tests (Unconsolidated Undrained (UU), Consolidated Undrained (CU) and Consolidated Drained (CD)), UCC test, Vane shear test. Stress- strain behavior

of soils-Stress path-Skemptons pore water parameters

UNIT-V: Earth Pressure: States of earth pressure-Active, passive, at rest condition; Rankine's theory: computation of active and passive earth pressure in cohesionless and c-φ soils; Coulomb's Wedge theory; Introduction to graphical solution.

Slope stability: Definition and classification of slopes-types and slope failures-Factors of safety with respect to cohesion, angle of shearing resistance, Height – Analysis of stability of slope using Swedish slip circle method and Taylor's stability number.

Learning Resources:

1. Murthy V.N.S., "A Textbook of Soil Mechanics & Foundation Engineering", CBS Publishers, 2015.
2. Gopal Ranjan, Rao A.S., "Basic and Applied Soil Mechanics", Wiley Eastern Limited, third edition, 2016.
3. Venkatramaiah C., "Geo-technical Engineering", New Age Publishers, fourth edition, 2012.
4. Shashi K.Gulhati and Manoj Datta, "Geotechnical Engineering", Tata Mc-Graw Hill, 2005
5. Braja M. Das, Khaled Sobhan, "Principles of Geotechnical Engineering", Cengage Learning, 2014
6. Craig's, R.F., "Soil Mechanics" Springer, 2013
7. Karl Terzaghi, Ralph B. Peck, Gholamreza Mesri., "Soil Mechanics in Engineering Practice" John Wiley & Sons, 07-Feb-1996
8. William Lambe T., Robert V. Whitman., "Soil Mechanics" John Wiley & Sons, 2012
9. Arora K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers Distributors revised and enlarged sixth edition, 2007.
10. Scott, R.F., "Principles of Soil Mechanics", Addison Wesley, Massachusetts,
11. IS Code: IS-2720, Methods of tests for Soils.
12. http://nptel.ac.in/courses/105101084/

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

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Duration of Internal Tests : 90 Minutes

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
ENVIRONMENTAL ENGINEERING

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: **PC550CE**
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Analyze water and waste water system and understand the concepts of demand, supply and distribution system and Identify various public health elements 2. State the stages involved in water and sewage design treatment, mechanism and disposal 3. Describe the concept of sludge and solid waste management.	1. Assess the demand, quality of water and concept of storm water. 2. Formulate preliminary design of waste water treatment plant. 3. Understand the characteristics of domestic sewage and methods of disposal. 4. Design of primary, secondary and tertiary treatment units of waste water and a simple sewerage system. 5. Understand the sludge and solid waste management.

UNIT-I: Water Demand and Forecasting Methods: Water demand and per capita consumption, population forecasting approaches. Water distribution systems and solution of a simple network using hardy cross method. Storm water sewers – storm water estimation by rational method.
Water Quality: Standards of potable water, Physical and Chemical Properties.

UNIT-II: Treatment of Water: Design of rectangular and circular sedimentation tanks, coagulation and flocculation, design of a flocculator. Filtration – types of filters and filter media. Design principles of slow and rapid sand filters, Disinfections – necessity and methods, chlorination of water supplied, Removal of hardness, tastes & odour control.

UNIT-III: Wastewater Characteristics and Disposal: Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Population equivalent, Relative Stability, Natural Methods of wastewater disposal-Self-purification of streams, Oxygen sag Analysis, Dilution into sea, disposal by land treatment

UNIT-IV: Waste Water Treatment: Preliminary treatment, Screens, Grit chambers. Trickling filter, Activated sludge process, Oxidation ponds, Oxidation ditches.

Sewage Conveyance – Sewer types and appurtenances. Velocity in sewers, Design of a simple sewerage system.

UNIT-V: Sludge: Sludge digestion and disposal methods – septic tanks – design parameters and working principles. Low cost waste treatment

Solid Waste: Types, source and composition of solid waste. Methods of collection, transportation and disposal

Learning Resources:

1. Punmia B.C., "Environmental Engineering Vol. I & II", Laxmi Publications Pvt Ltd., New Delhi, 2015
2. Birdi G.S, "Water Supply and Sanitary Engineering", Dhanpat Rai & Sons, 2014
3. Peavy H.S., Rowe D.R., Tchobanoglous G., "Environmental Engineering", Tata McGraw Hills, New Delhi, 2017
4. Metcalf & Eddy M.C., "Waste Water Engineering – Treatment & Reuse", Tata McGraw Hill Publications, New Delhi, 2003
5. http://nptel.ac.in/courses/105106119/

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

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCE
HUMAN VALUES AND PROFESSIONAL ETHICS-II

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs/Week) : 1 hour	SEE Marks : 40	Course Code: **U19HS020EH**
Credits:1	CIE Marks : 30	Duration of SEE : Hours : 02

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

UNIT-1 PERSONAL ETHICS AND PROFESSIONAL ETHICS

a. **PERSONAL ETHICS**: A person 's personal or self-created values and codes of conduct. Civic virtues and Civic sense.

b. **NEED FOR ETHICAL CODES**

Code of Professional Ethics- Observance of the code, Obligations towards the Features of professional ethics: Openness, Transparency, Privacy, Impartiality, Practicality, Loyalty. Profession, Ethics and Information Security, Deterring Unethical and Illegal Behaviour, Work ethics.

UNIT-2 GENDER SENSITISATION

a. Social issues regarding women - Female infanticide and foeticide, dowry & property rights, violence against women.

b. Impact of globalization on the status of women - Political and legal empowerment

c. Women at work- Success stories.

Post independence and current movements in India (Telengana movement 1948-50, Chipko movement 1973, Navnirman movement 1974, question of Representation in Politics)

Change makers - Shashi Deshpande, Taslima Nasreen, Kumkum Sangari, Veena Mazumdar, Neera Desai.

Women's Studies in India--UGC's initiatives -- Centers for Women's Studies-Capacity building for Women leaders in education—Women development clls--Women's Studies in the XIth Plan.

Women role models -- Case studies– Indira Gandhi, Kiran Mazumdar, Kiran Bedi, Ela Bhatt, Mother Teresa, PT Usha, Rukminidevi Arundale, Annie Beasant, Sarojini Naidu, Medha Padhkar, Kalpana Chawla, etc.}

MODE Of DELIVERY

• **Questionnaires** • **Quizzes** • **Case-studies** • **Observations and practice** • **Home and classroom assignments**	• **Discussions** • **Skits** • **Short Movies/documentaries** • **Team tasks and individual tasks** • **Research based tasks** • **Viva**

Relavant Websites,CD's and Documentaries

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

Learning Resources:

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

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
Finishing School-III: Technical Skills

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):1:0 :0	SEE Marks:40	Course Code: **MC510CE**
Credits : 1	CIE Marks:30	Duration of SEE:2Hrs

Introduction to BIM Concepts

1. Introduction to BIM
2. Draw and modify walls & Complex Walls
3. Add and modify wall profiles
4. Place Doors, windows & Components
5. Dimensions and Constraints
6. Create Floor, roofs and Ceilings
7. Curtain walls, grids and mullions
8. Railing, Stairs & Ramps
9. Conceptual models
10. Annotations, legends and Schedules
11. Sheets and Title Blocks
12. Materials and lighting
13. Views, camera, Walk – through, Render & Solar study
14. In place families and families creations
15. Massing and Site Design
16. Link projects & collaboration
17. Realistic presentations
18. Import & Export

The content of technical skills may be altered based on the industry requirements and third party technical expertise available.

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
Hydraulics & Hydraulics Machinery Lab

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):0:0:2	SEE Marks:50	Course Code: **PC531CE**
Credits : 1	CIE Marks:30	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to introduce	Upon the completion of the course, students are expected to
1. Manning's rugosity coefficient and super elevation in open channels. 2. Impact coefficient on different types of vanes and drag & lift forces in wind tunnel. 3. Pre and post jump depths and calculate loss of energy in hydraulic jump. 4. Familiarize with the procedures of calculating overall efficiency of different types of pumps and turbines.	1. Determine Manning's rugosity coefficient and measure super elevation in an open channel and estimate loss of energy in hydraulic jump. 2. Evaluate impact coefficient for different types of vanes. 3. Evaluate the overall efficiency of various pumps and turbines and draw performance characteristic curves. 4. Practice working as a team member and lead a team 5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively

LIST OF EXPERIMENTS

1	Open Channel Flow	Determination of Manning's rugosity coefficient
2	Open Channel Bend	Determination of super elevation
3	Impact of Jets	Determination of vane coefficient on different types of vanes
4	Centrifugal pump	Determination of efficiency and performance characteristics.
5	Centrifugal pump test rig	Determination of efficiency and performance Characteristics under varying loads

6	Pelton Wheel Turbine	Determination of efficiency and Performance characteristics
7	Francis Turbine	Determination of efficiency and Performance characteristics
8	Kaplan Turbine	Determination of efficiency and Performance characteristics
9	Self priming pump	Determination of efficiency and performance characteristics
10	Wind tunnel	a) To study Drag & Lift characteristic of different angles of attack and find coefficient of drag and lift b) Study pressure distribution over an aerofoil
11	Hydraulic Jump	Determination of pre and post jump depth in channel flow

Learning Resources:
http://eerc03-iiith.virtual-labs.ac.in/ index.php? section=List% 20of%20experiments

No. of Internal Tests: 01 Max. Marks for Internal Test: 12

Marks for assessment of experiments 18

Duration of Internal Test: 2 Hours

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

DEPARTMENT OF CIVIL ENGINEERING
SOIL MECHANICS LAB

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):0 : 0 : 2	SEE Marks:50	Course Code: **PC541CE**
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to introduce	Upon the completion of the course, students are expected to
1. Index and engineering properties o various soils 2. Field test procedures	1. Determine the index properties of soils and classify soils. 2. Determine Direct shear strength and Triaxial shear strength of a soil sample 3. Calculate Permeability and determine the compaction characteristics of soils 4. Practice working as a team member and lead a team 5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively.

LIST OF EXPERIMENTS

DETERMINATION OF INDEX PROPERTIES:

1. Determination of Specific Gravity of soil solids using “Density bottle” method.
2. Determination of Specific Gravity & water content using “Pycnometer” method.
3. Determination of Liquid limit using Casgrande’s and Cone Penetration standard LL device.
4. Determination of Shrinkage and Plastic limits
5. Sieve Analysis including Hydrometer Analysis for plotting Particle size distribution curve
6. Determination of Field Density using Core cutter Method

7. Determination of Field Density using Sand Replacement Method

DETERMINATION OF ENGINEERING PROPERTIES

8. Determination of Compaction Characteristics by Standard Proctor test
9. Determination of Laboratory California Bearing Ratio (CBR) value
10. Determination of Co-efficient of Permeability by Constant Head Permeameter test and Variable Head Permeameter tests
11. Swell pressure test on expansive soils
12. Determination of shear strength parameters by Direct Shear Test
13. Determination of Shear Strength of Cohesive soils by "vane shear test"
14. Determination of Shear Strength by conducting "Triaxial Shear Test"
15. Determination of Co-efficient of Consolidation

DEMONSTRATION OF TEST PROCEDURES:

16. Standard Penetration Test

Learning Resources:

1. http://eerc02-iiith.virtual-labs.ac.in/
2. http://home.iitk.ac.in/~madhav/geolab.html

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment of experiments			18

Duration of Internal Test: 2 Hours

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

DEPARTMENT OF CIVIL ENGINEERING
Concrete Technology Lab

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):0:0 : 2	SEE Marks:50	Course Code: **PC551CE**
Credits :1	CIE Marks:30	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Determine the physical properties of cement, fine aggregate and coarse aggregate 2. Determine workability of concrete 3. Determine the strength of concrete using destructive and non-destructive methods	1. Determine the physical properties of cement, fine aggregate and coarse aggregate 2. Determine the workability of concrete 3. Determine the compressive strength using destructive and non-destructive methods and flexural strength by destructive method. 4. Practice working as a team member and lead a team 5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively

LIST OF EXPERIMENTS

I TESTS ON CEMENT

1 (a) Specific gravity of cement.
(b) Unit weight or bulk density of cement.
2 Normal consistency of cement.
3 (a) Initial setting time of cement
(b) Final setting time of cement
(c) Fineness of cement by sieving
4 Compressive strength of cement

II TESTS ON AGGREGATE:

5 (a) Specific gravity of fine aggregate.
(b) Bulk density of fine aggregate.
6 (a) Specific gravity of coarse aggregate.

(b) Bulk density of coarse aggregate.

7 Bulking of sand by laboratory method.

8 Bulking of sand by field method.

9 Fineness modulus of fine aggregate.

10 Fineness modulus of coarse aggregate.

III TESTS ON CONCRETE

11 Workability of concrete by slump test

12 Workability of concrete by compacting factor test

13 Compressive strength of concrete

14 Flexural strength of concrete

IV EXPERIMENTS FOR DEMONSTRATION ONLY

15 Non-Destructive Testing of Concrete Structures.

16 Workability of concrete by Flow test

17 Workability of concrete by Vee-Bee test.

Learning Resources:

1. IS: 269-1989, Indian Standard Code of Practice for Ordinary Portland Cement, 33 Grade – Specifications (Fourth Revision), Bureau of Indian Standards, New Delhi
2. IS: 8112-1989, Indian Standard Code of Practice for 43 Grade Ordinary Portland Cement – Specifications (First Revision), Bureau of Indian Standards, New Delhi
3. IS: 12269-1987, Indian Standard Code of Practice for Ordinary Portland Cement, 53 Grade – pecifications, Bureau of Indian Standards, New Delhi
4. IS: 650-1991, Indian Standard Code of Practice for Standard Sand for Testing Cement – Specifications (Second Revision), Bureau of Indian Standards, New Delhi
5. IS: 2386 (Part-III) -1963, Indian Standard Methods of Test for Aggregates for Concrete, Bureau of Indian Standards, New Delhi
6. IS: 1199-1959, Indian Standard Methods of Sampling and Analysis of Concrete, Bureau of Indian Standards, New Delhi
7. IS: 516-1959, Indian Standard Methods of Tests for Strength of Concrete, Bureau of Indian Standards, New Delhi
8. IS: 13311 (Part-1)-1992, Indian Standard Non-Destructive Testing of Concrete – Methods of Test, Part-1 Ultrasonic Pulse Velocity, Bureau of Indian Standards, New Delhi
9. IS: 13311 (Part-2)-1992, Indian Standard Non-Destructive Testing of Concrete – Methods of Test, Part-2 Rebound Hammer, Bureau of Indian Standards, New Delhi
10. IS: 4031(Part-2)-1999, Indian Standard Methods of Physical Tests for Hydraulic Cement, Determination of Fineness by Blaine Air Permeability Method, Bureau of Indian Standards, New Delhi

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment of experiments			18

Duration of Internal Test: 2 Hours

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

DEPARTMENT OF CIVIL ENGINEERING
MINI PROJECT: SURVEYING CAMP

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):0:0:0	SEE Marks:30	Course Code: **PW519CE**
Credits : 1	CIE Marks: - - -	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to introduce	Upon the completion of the course, students are expected to
1. Field exercises with modern surveying equipment including GPS and Total Station. 2. All aspects of executing and plotting of field surveys 3. Capturing topographical features	1. Measure the topographical features using advanced surveying instruments such as total station and GPS 2. Plot the data obtained in the field through mapping software like QGIS / ArcGIS 3. Interpret the need for accurate and thorough note taking process in the field work to serve as a team member.

Course Content:

A one week (6 days, 36 hours) surveying camp shall be organized in the intervening period between the completion of the IV semester and the commencement of V semester.

The work has to be graded for 30 Sessional marks by a committee consisting of the Head of the Department and 2 - 3 senior faculty members.

The surveying camp shall expose the students to all the aspects of planning, organizing and conducting a field survey, and plotting of the same.

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN B.E. V SEMESTER (2019-20)

Dept	Title	Code	credits
Civil	Remote Sensing and GPS	OE510CE	3
CSE	Fundamentals of Object Oriented Programming	OE510CS	3
CSE	Web Design	OE520CS	3
ECE	Mathematical Programming for Engineers	OE510EC	3
ECE	Sensors for Engineering Applications	OE520EC	3
EEE	Solar Power and Applications	OE510EE	3
IT	Introduction to Database Management Systems	OE510IT	3
IT	Introduction to Statistical Programming	OE520IT	3
Mech.	Optimization Methods	OE510ME	3
Mech.	Introduction to Robotics	OE520ME	3
Maths.	Discrete Mathematics for Engineers	U19OE520MA	3

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

DEPARTMENT OF CIVIL ENGINEERING
REMOTE SENSING AND GPS

(Open Elective-IV)

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3:0: 0	SEE Marks:60	Course Code: **OE510CE**
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to	Upon the completion of the course, students are expected to
1. To provide fundamental knowledge on geo spatial technology such as Remote sensing and GPS	1. Understand the characteristics of the electromagnetic radiation and their interactions with the atmosphere and surface features for better analysis and interpretation of the remote sensing data. 2. Explain the various remote sensing systems, satellite characteristics and elements of visual interpretation techniques 3. Describe the fundamental theory and concepts of the Global Positioning System to provide 3D positioning with great accuracy. 4. Compute errors and biases in GPS measurements and understand the differences between point and relative GPS positioning. 5. Present the applications of remote sensing and GPS in various fields

Unit I: Introduction and Basic Concepts of Remote Sensing

Introduction, Basic concepts of remote sensing, Airborne and space born sensors, Passive and active remote sensing, EMR Spectrum, Energy sources and radiation principles, Energy interactions in the atmosphere, Energy interactions with earth surface features, Atmospheric windows, Spectral reflectance curves

Unit II: Remote Sensing Systems

Satellites and orbits, Polar orbiting satellites, Image characteristics and different resolutions in Remote Sensing, Multispectral, thermal and hyperspectral remote sensing. Some remote sensing satellites and their features, Map and Image, color composites, introduction to digital data, elements of visual interpretation techniques.

Unit III: Global positioning Systems (GPS)

Overview of GNSS and Introduction to GPS, GLONASS, GALILEO, COMPASS, IRNSS systems

GPS: Basic concepts, Functional system of GPS – Space segment, control segment and user segment, Working principle of GPS, Signal structure and code modulation, Pseudo-range measurements and navigation message

Unit IV : Errors and Positioning methods of GPS

Errors and biases in GPS measurements, Accuracy of navigation position: UERE and DOP, Intentional degradation of GPS signals: Selective availability (SA) and Anti-spoofing (AS) Differential GPS: Space based augmentation systems (e.g., SBAS, GAGAN) and Ground based augmentation systems (e.g., WASS, EGNOS)

GPS Carrier Phase measurements: Single Differencing, Double Differencing and Triple Differencing in GPS measurements.

Surveying with GNSS: Point positioning, Relative positioning, Static and Kinematic positioning.

Unit V : Applications of remote sensing and GPS

Applications of remote sensing and GPS in various fields, Integration of remote sensing, GPS and GIS.

Learning Resources:

1. James B. Campbell & Randolph H. Wynne., Introduction to Remote Sensing, The Guilford Press, 2011
2. Lillesand, Kiefer, Chipman., Remote Sensing and Image Interpretation, Seventh Edition, 2015
3. Leick, A., GPS Satellite Survey, John Wiley: NJ, 2015
4. Hofmann, B., Lichtenegger H. and Collins J., Global Positioning System: Theory and Practice, Springer: Berlin, 2011.
5. Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011.
6. Hofmann-Wellenh of, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013

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

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

Duration of Internal Tests : 90 Minutes

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

Department of Computer Science & Engineering
FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING

(OPEN ELECTIVE-IV)

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **OE510CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Apply object oriented 2 principles for developing an application using Java constructs. Design GUI using existing Java classes and interfaces.	1. Adopt the fundamentals of Object oriented system development for developing a application. 2. Apply basic features of OOP to design an application. 3. Employ runtime error handling, concurrent programming practices to develop a parallel processing application. 4. Perform string handling, read and write operations using console and files IO streams. 5. Design GUI for a java application using AWT classes.

UNIT-I: Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Concepts, Benefits of Object Oriented Development.
Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements.

UNIT-II: Building blocks of OOP: Classes and Methods, Constructor, Parameterized constructor, Garbage Collection, this, static, final keywords, Inheritance, types of inheritance, Method Overriding, Abstract class, Nested class, Interface, Package.

UNIT-III: Exception Handling: try, catch, throw, throws, finally, creating user defined exceptions
Multithreaded Programming: Types of Thread creation, multiple threads, isalive, join, thread priority, Thread Synchronization, Inter process communication.

UNIT-IV: String Handling: String constructors, operations, character extraction, comparison, search, modification. StringBuffer, methods, StringBuilder, StringTokenizer
Util: Date, Calendar, Random, Timer, Observable
IO: Files and Directories, I/O Classes and Interfaces, Byte Streams classes and Character Stream classes

UNIT-V: Applet: Applet Class, Applet architecture
Event Handling: The Delegation Event Model, Event Classes, Source of Events, Events Listener Interfaces
GUI Development: AWT: Classes, Working with Graphics, Frames, Menu, Layout Managers**.**

Learning Resources:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill 2005.
2. P. Radha Krishna, Object Oriented Programming through Java, Universities Press, 2007.
3. Sachin Malhotra, Saurabh Choudhary, Programming in Java, 2nd Edition, Oxford Press, 2014.
4. https://docs.oracle.com/javase/tutorial/java

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

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

Department of Computer Science & Engineering
WEB DESIGN (OPEN ELECTIVE-IV)

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **OE520CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
To Develop web application using HTML, CSS, JavaScript and PHP.	1 Design static web pages. 2 Apply styles to the web pages. 3 Create dynamic web pages using JavaScript. 4 Design DTD and schema for a given XML file.\ 5 Develop server side components using PHP.

UNIT-I: Web Basics and overview: Introduction to Internet, World Wide Web, Web Browsers, Web Servers, URL, MIME, HTTP, Web Programmers Tool Box, Introduction to HTML Purpose of HTML and XHTML, Text Formatting, Hypertext Links, Images, Lists, Tables, Forms and Frames.

UNIT-II: Cascading Style Sheets- Levels of Stylesheet, Style Specification Formats, Selector Formats, Property Value Forms, Font Properties, List Properties, Alignment of Text, Box Model, Background Images, Borders, div and span tags, Conflict Resolution.

UNIT-III: JavaScript - Object Orientation and JavaScript, Primitives, Operations, Expressions, Control Statements, Object Creation, Arrays, Functions-Introduction, Program Modules in JavaScript, Programmer-Defined Functions, Function Definitions, Random-Number Generation, Scope Rules, JavaScript Global Functions, Recursion, Constructors, Regular Expressions, DOM Model, Events, Event Handling in JavaScript, JavaScript objects.

UNIT-IV: Introduction to XML, Syntax of XML, XML Document Structure, Document type Definition, Namespaces and Schemas.
Client-Server Architecture, Multi-tier Architecture, Web server.

UNIT-V: PHP- Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies and Session Tracking.

Learning Resources:

1. Robert W. Sebesta, "Programming the World Wide Web", Pearson Education.(3rd)
2. Uttam K.Roy, "Web Technologies", Oxford publishers.
3. http://www.w3schools.com
4. https://www.php.net/manual/en/tutorial.php

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MATHEMATICAL PROGRAMMING FOR ENGINEERS

(OPEN ELECTIVE)

SYLLABUS FOR B.E. V - SEMESTER (for other branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **OE510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To provide fundamental knowledge of programming language for solving problems.	*On completion of the course, students will be able to* 1. Generate arrays and matrices for numerical problems solving. 2. Represent data and solution in graphical display. 3. Write scripts and functions to easily execute series of tasks in problem solving. 4. Use arrays, matrices and functions in Engineering applications 5. Design GUI for basic mathematical applications.

UNIT - I : Introduction:
Basics of MATLAB, MATLAB windows, Advantages of MATLAB,on-line help, file types.
MATLAB Basics: Variables and Constants –Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple plots, Creating ,Saving and Executing a Script File, Creating and Executing a function file.
Programming Basics: Data types-Operators – Hierarchy of operations, Relational and logical operators, if-end structure, if-else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands.

UNIT - II : Scripts and Functions
Script Files, Function Files, Debugging methods in MATLAB.
Graphics: Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots-subplots-specialized 2D plots: stem-,bar, hist, pi, stairs, loglog , semilog ,polar ,comet 3D plots: Mesh,Contour,Surf,Stem3,ezplot.
UNIT - III : Numerical Methods Using MATLAB

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

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

UNIT - IV : Nonlinear Equations

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

UNIT - V :

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

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SENSORS FOR ENGINEERING APPLICATIONS (OPEN ELECTIVE)

SYLLABUS FOR B.E. V - SEMESTER (for other branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **OE520EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. The student will come to know the various stimuli that are to be measured in real life instrumentation. 2. He will be able to select the right process or phenomena on which the sensor should depend on 3. He will be aware of the various sensors available for measurement and control applications.	*On completion of the course, students will be able to* 1. Appreciate the operation of various measuring and control instruments which they encounter in their respective fields. 2. Visualize the sensors and the measuring systems when they have to work in areas of interdisciplinary nature and also think of sensors and sensors systems when for a new situation they encounter in their career 3. Identify and select the right process or phenomena on which the sensor should depend on. 4. Know various stimuli that are to be measured in real life instrumentation.

UNIT - I

Introduction: What is a sensor and what is a transducer? Electrical sensor – need for sensors in the modern world. Different fields of sensors based on the stimuli - various schematics for active and passive sensors.

General characteristics and specifications of sensors – Implications of specifications uses of sensors – measurement of stimuli - block diagram of sensor system. Brief description of each block.

UNIT – II

Sensors for mechanical systems or mechanical sensors - Displacement - acceleration and force - flow of fluids – level indicators – pressure in fluids – stress in solids. Typical sensors - wire and film strain gauges, animometers, piezo electric and magnetostrictive accelerometers, potentiometric sensors, LVDT.

UNIT – III

Thermal sensors – temperature – temperature difference – heat quantity. Thermometers for different situation – thermocouples thermistors – color pyrometry.

Optical sensors: light intensity – wavelength and color – light dependent resistors, photodiode, photo transistor, CCD, CMOS sensors.

Radiation detectors: radiation intensity, particle counter – Gieger Muller courter (gas based), Hallide radiation detectors.

UNIT – IV

Magnetic sensors: magnetic field, magnetic flux density – magneto resistors, Hall sensors, super conduction squids.

Acoustic or sonic sensors: Intensity of sound, frequency of sound in various media, various forms of microphones, piezo electric sensors.

UNIT – V

Electrical sensors: conventional volt and ammeters, high current sensors, (current transformers), high voltage sensors, High power sensors.

High frequency sensors like microwave frequency sensors, wavelength measuring sensors.

MEMs and MEM based sensors.

Learning Resources :

1. Doebelin, "Measurement Systems: Application and Design", McGraw Hill Kogakusha Ltd.
2. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim "Microsensors, MEMS and Smart Devices", New York: Wiley, 2001.
3. Henry Bolte, "Sensors – A Comprehensive Sensors", John Wiley.

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

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

Duration of Internal Tests: 90 Minutes

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

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

SOLAR POWER AND APPLICATIONS

(Open Elective – IV)

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks: 60	Course Code: **OE510EE**
Credits :3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. To impart the basics of solar energy harnessing and solar panel and array.	1. Compare different energy resources.
	2. Identify and choose proper type of meter for solar radiation measurement.
	3. Use proper solar thermal system according to the load requirements.
	4. Categorize and compare photovoltaic cells.
	5. Apply the knowledge of solar energy.

Unit – I: Fundamentals of Energy Sources:
Oil crisis of 1973, Classifications of Energy Resources, Importance of Non-conventional energy sources, Advantages-disadvantages and salient features of Non-conventional energy sources.

Unit – II: Solar Energy Basics:
Sun as a source of energy, the Earth, Radiation Spectrums, Extraterrestrial and Terrestrial Radiations, Depletion of solar Radiation, Pyranometer, Pyrheliometer, Sunshine Recorder.

Unit – III: Solar Thermal Systems:
Solar Collectors, Solar Water Heater, Solar Passive space – heating and cooling systems, Solar Cookers, Solar furnaces, Solar thermal water pump, Vapour compression refrigeration and Solar pond Electric power plant.

Unit – IV: Solar Photovoltaic Systems:
Solar Cell fundamentals, Cell characteristics, Cell classification, Module, Panel

and Array, Maximizing the Solar PV output and load matching, MPPT.

Unit – V: Solar PV systems & Applications:

Solar PV system classification - Stand-Alone Solar PV system and Grid-Interactive Solar PV system. Applications - Water Pumping, lighting, medical refrigeration, village power and Telecommunication.

Learning Resources:

1. B H Khan, Non-Conventional Energy Resources, 2nd Edition, Tata McGraw Hill.
2. G. D. Rai, Non-Conventional Energy Sources, 13th Reprint 2014, Khanna Publications.

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

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

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

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

(Open Elective-IV)

SYLLABUS FOR B.E. V SEMESTER
(Common for CIVIL, ECE, EEE & MECH)

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code :**OE510IT**
Credits :3	CIE Marks: 40	Duration of SEE :3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
Apply the concepts of database management systems and design relational databases.	1. Understand functional components of the DBMS and develop ER model for a given problem and map ER it to Relational model 2. Understand Relational model and basic relational algebra operations. 3. Devise queries using SQL. 4. Design a normalized database schema using different normal forms. 5. Understand transaction processing and concurrency control techniques.

UNIT – I

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Architecture, Database Users and Administrators.

Database Design and the E-R Model: Overview of the Design Process, The E-R Model, Constraints, E-R Diagrams

UNIT – II

Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Fundamental Relational-Algebra Operations.

UNIT – III

Structured Query Language: Introduction, Data Definition, Basic Structure of SQL Queries, Modification of the Database, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Join Expressions, Views.

UNIT – IV

Relational Database Design: Features of Good Relational Design, Normalization-Decomposition Using Functional Dependencies, Functional-Dependency Theory.

UNIT – V

Transactions: Transaction Concepts, Transaction State, Concurrent Executions, Serializability

Concurrency Control: Lock-Based Protocols, Timestamp-Based Protocols.

Learning Resources :

1. Abraham Silberschatz, Henry F Korth, S. Sudarshan, Database System Concepts, 6th Edition, McGraw-Hill International Edition, 2011.
2. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill International Edition, 2003.
3. Elmasri, Navathe, Somayajulu and Gupta, Fundamentals of Database System, 6th Edition, Pearson Education, 2011.
4. Patric O'Neil, Elizabeth O'Neil, Database-principles, programming, and performance,Morgan Kaufmann Publishers, 2001.
5. Peter Rob, Carlos coronel, Database Systems, (2007), Thomoson.
6. https://nptel.ac.in/courses/106105175/

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO STATISTICAL PROGRAMMING
(Open Elective-IV)
SYLLABUS OF B.E V- SEMESTER
(Common for CIVIL, ECE, EEE & MECH)

L:T:P(Hrs./week): 3:0:0	SEE Marks :60	Course Code :**OE520IT**
Credits : 3	CIE Marks: 40	Duration of SEE :3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
The course will enable the students to apply the R programming language in the analysis of Statistical data.	1. Write simple programs in R language to manipulate and visualize the data. 2. Write complex program using different constructs of R language to solve simple problems. 3. Use R programming language in the simulation of different types of random variables. 4. Write programs using R language in the analysis and computation of different matrix operations. 5. Use R programming language in the simulating multivariate random numbers, Markov chain, and Monte carlo integration

Unit I: Introduction to R Language
Basic features of R, Built-in functions, logical vectors and relational operators, Data input and output, programming statistical graphs- High-level plots, low level graphic functions.

Unit II: Programming with R
Flow control, Managing complexity through functions, Miscellaneous programming tips, Debugging and maintenance, Efficient programming.

Unit III: Simulation
Montecarlo simulation, Generation of pseudo random numbers, Simulation of other random variables-Bernouli, Binomial, Poisson, Exponential and Normal random variables.

Unit IV: Computational Linear Algebra

Vectors and matrices in R, Matrix multiplication and inversion, Eigen values and Eigen vectors

Unit V: Advances Simulation methods

Multivariate random number generation, Markov Chain Simulation, Monte Carlo Integration, other Advanced Simulation methods

Learning Resources:

1. A first Course in Statistical Programming with R, W. John Braun, Duncan J. Murdoch, Cambridge University Press, 2007.
2. https://cran.r-project.org/manuals.htm

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

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

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

OPTIMIZATION METHODS (OE-IV)

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **OE510ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able to*
The objective of the course is to understand Linear & non-linear programming, transportation modeling , CPM & PERT for project scheduling and control, and application of various optimization techniques for respective field engineering (Inter disciplinary)	1 optimization of resources in multi disciplinary areas through linear programming under different conditions.
	2 sensitivity analysis of a linear programming problem as per customer requirements tosuit various Organizations.
	3 minimization of total cost to apply for transportation techniques for the transhipment of Goods and products and Implement techniques like project management to analyze about material management.
	4 optimization of resources in multi disciplinary areas through non-linear programming under different conditions.

UNIT-I: OPTIMIZATION-AN OVERVIEW

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

UNIT-II: ADVANCED TOPICS IN LINEAR PROGRAMMING

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

UNIT-III

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

Project Scheduling: Introduction to network analysis, Rules to draw network

diagram, Fulkerson rule for numbering events, Critical path method, PERT.

UNIT-IV

Non linear programming problems: Optimization methods for single variable, multivariable functions, Maxima-Minima

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

UNIT-V

Non Linear - Unconstrained Optimization

classification, scaling of design variables, Random search methods, Univeriate search, pattern Directions, Hook Jeeves, Powel method, Rosenbrock method.

Learning Resources:

1. Singiresu S.Rao, “Engineering optimization- Theory and Practice”, 4th Edition, John Wiley and Sons, 2009.
2. NVS Raju, “Optimization methods for Engineers ", PHI Learning Pvt. Ltd., 2014.
3. Prem Kumar Gupta and Dr. DS Hira, “Operations Research", S.Chand & Company Pvt. Ltd., 2014.
4. R. Paneerselvam, “Operations Research”, PHI Learning Pvt Ltd., 2009.
5. Kalyanmoy Deb, Optimization for Engineering Design- algorithms and examples, PHI Pvt. Ltd., 1st Edition 2003, Delhi.

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

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

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

DEPARTMENT OF MECHANICAL ENGINEERING

INTRODUCTION TO ROBOTICS (OE-IV)
SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **OE520ME**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able to*
The objective of the course is to identify robots and their peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.	1 understand the anatomy of the robot and various robot configurations for it's selection depending on the task.
	2 classify the end effectors , understand different types of joints, various types of mechanical actuation and robot drive systems for carrying out the assigned job effectively.
	3 analyze a planar manipulator through forward kinematics and understand the control of robot manipulator for better reliability and efficiency.
	4 Classify various sensors used in robots for proper selection to an application.
	5 summarize various industrial and non-industrial applications of robots for their selection to a particular task.

UNIT-I : ROBOT BASICS
Robot-Basic concepts, Need, Law, History, Anatomy, specifications.
Robot configurations-cartesian, cylindrical, polar ,articulated and SCARA.
Robot wrist mechanism, Precision and accuracy of robot.

UNIT-II : ROBOT ELEMENTS
End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot drive system types: Electrical, pneumatic and hydraulic. Position and velocity feedback devices, Robot joints and links-Types, Motion interpolation.

UNIT-III : ROBOT KINEMATICS AND CONTROL

Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation- Scaling, Rotation and Translation, Homogeneous transformation. D-H matrix. Forward kinematics for a 2-link RR planar manipulator.
Control of robot manipulators – Point to point and Continuous Path Control. Robot programming.

UNIT-IV : ROBOT SENSORS

Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors, Light sensors, Pressure sensors.
Introduction to Machine Vision and Artificial Intelligence.

UNIT-V : ROBOT APPLICATIONS

Applications of robots in Industries, Medical, Household, Entertainment, Space, Underwater, Defense, and Disaster management.
Applications of Micro and Nanorobots, Future Applications of robots.

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel and Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata McGraw-Hill Publishing Company Limited, 2nd Edition , 2008.
2. Deb. S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2nd Edition, 2010.
3. Klafter R.D, Chmielewski T.A, and Negin. M, "Robotic Engineering: An Integrated Approach", Prentice Hall of India Pvt. Ltd., 1994.
4. K.S. Fu,R.C. Gonzalez and C.S.G. Lee , "Robotics control, sensing, vision and intelligence",Tata Mc Graw-Hill Publishing Company Limited, 2008
5. R.K. Mittal and I.J. Nagrath "Robotics and Control", Tata McGraw-Hill Publishing Company Limited,2003.

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

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

***With effect from* :2019-20(R-19)**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
9-5-81, Ibrahimbagh, Hyderbad-500031, Telangana State

DEPARTMENT OF MATHEMATICS
(OPEN ELECTIVE)

DISCRETE MATHEMATICS FOR ENGINEERS for
SYLLABUS FOR B.E., V- Sem., (CBCS)
(w.e.f: 2019-20)

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U19OE520MA**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the students to:	***At the end of the course students will be able to:***
1. **Understand** Propositions and their equivalences, predicates and quantifiers and learn various proof strategies. 2. **Study** the concepts of number theory such Modular Arithmetic, Congruences and basic cryptography etc., 3. **Understand** the basics of counting, combinatory, and various methods of solving Recurrence relations. 4. **Understand** Relations, Equivalence relations, Posets and Hasse diagrams. 5. **Analyze** the concepts of Graphs.	1. **Use logical notation** to define and reason about **fundamental mathematical concepts and synthesize induction hypothesis and simple Induction proofs**. 2. **Prove elementary properties of modular arithmetic** and basic cryptography and apply in Computer Science. 3. **Calculate number of possible outcomes** of elementary combinatorial processes such as permutations and combinations **Model and analyze computational processes** using analytic and Combinatorial methods. 4. **Prove** whether a given relation is an equivalence relation/ poset and will be able to draw a Hasse diagram. 5. **Apply** graph theory models of data structures and to solve problems of connectivity**.**

UNIT – I Logic: Logic- Logical connectives- Propositional equivalences– Predicates and quantifiers – Nested quantifiers.
Mathematical Reasoning, Induction: Proof Strategy- Methods of Proofs- Mathematical Induction- Second Principle of Mathematical Induction.

UNIT – II Number Theory: The Integers and Division- Division Algorithm- Fundamental Theorem of Arithmetic –Modular Arithmetic-Integers and Algorithms- Euclidean Algorithm -Linear Congruences- Fermat's Little Theorem

UNIT – III Counting: Basics of counting- Pigeonhole principle- Permutations and combinations – Pascal's Identity- Vandermonde's Identity- Generalized Permutations and combinations.
Advanced Counting Techniques: Recurrence relations: Solving Recurrence Relations- Linear Homogeneous and Non-Homogeneous Recurrence relations.

UNIT – IV Relations: Relations – Properties -Representing relations - Equivalence Relations - Partial Orderings- Poset.

UNIT –V Graph Theory: Introduction- Types of graphs- Graph terminology- Basic theorems- Representing Graphs and Graph Isomorphism - Connectivity- Euler and Hamiltonian paths -

Learning Resources:

1. Kenneth H.Rosen – Discrete Mathematics and its application – 5th edition, Mc Graw – Hill, 2003.
2. Joel. Mott. Abraham Kandel, T.P.Baker, Discrete Mathematics for Computer Scientist & Mathematicians, Prentice Hall N.J., 2nd edn, 1986.
3. Discrete and Combinatorial Mathematics by Ralph P. Grimaldi , Pearson International
4. J.P.Trembly, R.Manohar, Discrete Mathematical Structure with Application to Computer Science, Mc Graw- Hill – 1997.
5. R.K. Bisht, H.S.Dhami - Discrete Mathematics, Oxford University Press, 2015.
6. http://mathworld.wolfram.com/topics
7. http://www.nptel.ac.in/course.php

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

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

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-17)
B.E. – CIVIL ENGINEERING : SIXTH SEMESTER (2019 - 2020)

B.E (Civil) VI Semester								
Course Code	**Name of the Course**	**Scheme of Instruction**			**Scheme of Examination**			
		Hours per Week			**Duration in Hrs**	**Maximum Marks**		**Credits**
		L	**T**	**P/D**		**SEE**	**CIE**	
THEORY								
HS610EH	Finishing School IV: - Soft Skills	1	-	-	2	40	30	1
PC610CE	Reinforced Concrete Design – II	3	-	-	3	60	40	3
PC620CE	Theory of Structures-II	3	-	-	3	60	40	3
PC630CE	Transportation Engineering	3	-	-	3	60	40	3
PC640CE	Design of Steel Structures	3	-	-	3	60	40	3
PC650CE	Hydrology and Water Resources Engineering	3	-	-	3	60	40	3
OEXXXX	Open Elective – V	3	-	-	3	60	40	3
MC610CE	Finishing School IV :–Technical Skills	1	-	-	2	40	30	1
PRACTICALS								
PC631CE	Transportation Engineering Lab	-	-	2	3	50	30	1
PC641CE	Computer Applications-I Lab	-	-	2	3	50	30	1
PC651CE	Environmental Engineering Lab	-	-	2	3	50	30	1
Student should acquire one online certificate course during III-VIII Semester								
TOTAL		**20**	**-**	**6**		**590**	**390**	**23**
GRAND TOTAL		**26**				**980**		
Note: The left over hours are to be allotted to CCA-IV / CC / RC / TC based on the requirement .								

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

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCE
FINISHING SCHOOL-IV: SOFT SKILLS

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs/Week) : 2	SEE Marks : 40	Course Code: U19HS610EH
Credits: 1	CIE Marks : 30	Duration of SEE : Hours : 90 Minutes

COURSE OBJECTIVES	COURSE OUTCOMES
This is a foundation course and aims at enhancing employability skills in students.	At the end of the course students will be able to:
1. Students will be introduced to higher orderthinking skills and problem solving on the following areas - Arithmetic ability, Numerical ability and General reasoning. 2. Students will be trained to work systematically with speed and accuracy while problem solving.	1. Solve questions on the above mentioned areas using short cuts and smart methods. 2. Understand the fundamentals concept of Aptitudeskills. 3. Perform calculations with speed and accuracy.

UNIT 1 QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED

- Time speed and distance
- Boats and Streams
- Problems on trains

UNIT 2 REASONING ABILITY- LOGICAL REASONING

- Seating Arrangements- Linear; Circular; Complex
- Venn diagrams
- Syllogism
- Cubes & Cuboids
- Dices

UNIT 3 REASONING ABILITY- NON VERBAL REASONING

- Figure Series
- Directions
- Clocks
- Calendars

UNIT 4 QUANTITATIVE APTITUDE -

- Mensuration Part -1
- Mensuration Part -2
- Logarithms

UNIT 5 QUANTITATIVE APTITUDE

- Permutations and combinations
- Probability

Learning Resources:

1. scoremore.talentsprint.com

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
REINFORCED CONCRETE DESIGN-II

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: **PC610CE**
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to introduce	Upon the completion of the course, students are expected to
1. Design codes of practice for Reinforced Concrete 2. Design of concrete structures viz., combined footing, retaining walls, water tanks and bridges as per standard codes of practice	1. Design rectangular combined footing and understand the principles of design of trapezoidal footing with limit state method according to IS456: 2000. 2. Analyse and design cantilever and counter fort retaining walls for different load conditions with limit state method according to IS456: 2000. 3. Analyse and design water tanks, resting on ground and overhead water tanks according to IS3370: 2009. 4. Understand IRC loadings for the analysis of bridges according to IRC5: 2000 and IRC6: 2000. 5. Design Slab bridge and T-beam bridge with IRC loadings according to IRC21: 2000.

UNIT-I: Combined Footing and Retaining walls: Limit state design & detailing of combined rectangular footing and principles of design of trapezoidal footing. Limit state design & detailing of cantilever and counter fort retaining walls subjected to different earth pressure conditions.

UNIT-II: Water Tanks: Elastic Design & Detailing for RCC circular and rectangular ground level and over-head water tanks-Design of staging. Principles of Design of Intze tanks.

UNIT-III: Bridges: IRC loadings; Elastic design and detailing of two lane, simply supported RC Slab Bridge using effective width method. Elastic design and detailing of two lane, simply supported RC T-beam bridge using effective width method, Pigeaud's method and Courbon's method.

Learning Resources:

1. Krishna Raju N., "Structural Design and Drawing – Reinforced Concrete and Steel", Orient Blackswan Pvt Ltd, 2009
2. Krishna Raju N., "Design of Bridges", Oxford & IBH Publication Company, 2008.
3. Jagadeesh T.R. and Jayaram M.A, "Design of Bridge Structures", PHI Learning Private Limited, 2014
4. Bhavikatti S.S., "Advanced R.C.C. Design", Volume-II, New Age International, 2016.
5. Shah H.J., "Reinforced Concrete", Volume-II, Charotar Publishing House, 2012.
6. Punmia B.C., Ashok k Jain, Arun K Jain, "Limit State Design of Reinforced Concrete", Laxmi Publications, 2012.
7. Krishna Raju N., "Advanced Reinforced Concrete Design", CBS Publishers, 2016.
8. IS:456-2000, Code of Practice for Plain and Reinforced concrete, Bureau of Indian Standards, New Delhi, India.
9. IS:3370-2009, Part I and Part IICode of Practice for Concrete Structures for Storage of Liquids, Bureau of Indian Standards, New Delhi, India.
10. IRC 5- 2000, Standard specification and code of practice for road bridges, Section I, General Features of Design, IRC, New Delhi, India.
11. IRC 6- 2000, Standard specification and code of practice for road bridges, Section II, Loads and Stresses, IRC, New Delhi, India.
12. IRC 112- 2011, Code of Practice fro concrete road bridges, IRC, New Delhi, India
13. SP 34: Handbook on Concrete Reinforcement and Detailing (With Amendment 1), Bureau of Indian Standards,New Delhi, India
14. IS: 875-1987 Code of Practice For Design Loads (Other Than Earthquake)For Buildings And Structures Parts (1,2,3,4&5), Bureau of Indian Standards, New Delhi, India

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
THEORY OF STRUCTURES - II

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):3:0 : 0	SEE Marks:60	Course Code: **PC620CE**
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Explain the use of influence line diagrams in the analysis of simply supported beams and trusses subjected to moving loads. 2. Analyze beams and frames using flexibility method and stiffness method, and to develop element stiffness matrices and assembly of global stiffness matrices.	1. Perform analysis of simply supported beam subjected to moving loads using influence line diagrams 2. Compute forces in the members of the trusses subjected dead load & live load using influence line diagrams 3. Apply flexibility method for analysis of beams and frames with degree of indeterminacy not exceeding three 4. Explain the principles of analysis of structures subjected to external forces using stiffness method. 5. Analyse the structures subjected to external loads by developing element stiffness matrices, assembly of global stiffness matrices and load matrices.

UNIT-I: Moving loads and influence line diagrams: Influence lines for reaction, bending moment and shear force. Determination of maximum bending moment and shear force for moving load systems on simply supported girders, Curves of maximum bending moment and shear force for simply supported girders traversed, by (i) single point load, (ii) two point loads, (iii) uniformly distributed load longer than span, and (iv) uniformly distributed load shorter than span, enveloping parabola and EUDLL.

UNIT-II: Moving loads on trusses and arches: Influence lines for forces in members of statically determinate trusses under moving loads (warren truss and Pratt truss). Influence line diagrams for three hinged parabolic arches.

UNIT-III: Flexibility & Stiffness Methods of Analysis: Analysis of continuous beams, pin jointed plane trusses, rigid jointed plane frames with static indeterminacy not exceeding three with flexibility method. Introduction to stiffness method

UNIT-IV: Direct Stiffness Method - I: Development of element stiffness matrices for bar and truss elements Transformation matrices, assembly of global stiffness matrices and load matrices. Finding displacements and member end action matrices. Initial stresses and strains.

UNIT-V: Direct Stiffness Method-II: Development of element stiffness matrices for beam and plane frame elements. Transformation matrices, assembly of global stiffness matrices and load matrices. Finding displacements and member end action matrices.

Learning Resources:

1. Vazirani V.N., Ratwani M.M, Duggal S.K., “Analysis of Structures - Vol. II Theory, Design and Details of Structures”, Khanna Publishers, 16th Edition, 2015.
2. Thandavamoorthy T.S., “Structural Analysis”, Oxford Higher Education, Second Edition, 2012.
3. Weaver and Gere, “Matrix Analysis of Framed Structures”, CBS Publisher, 2004
4. Ramamrutham S., Narayan R., “Theory of Structures”, Dhanpath Rai publications, 2014
5. Devdas Menon, "Structural Analysis", 1st Edition, Narosa Book Distributors Pvt Ltd,2014.
6. Reddy C.S., "Basic Structural Analysis", 3rd Edition, Mc Graw Hill, 2010.
7. Junarkar S.B., Shah, “Mechanics of Structures”, Volume II, Charotar Pub. House, 2010.
8. Chu-Kia Wang, “Intermediate Structural Analysis (English) 1st Edition”, McGraw Hill Education, 2010.

9. Hibbeler R.C., “Structural Analysis”, 8/E, Prentice Hall, Higher Education, 2012.
10. Louis F. Geschwindner, Harry H. West, "Fundamentals of Structural Analysis", 2nd Edition, Wiley India Pvt. Ltd., 2011.
12. Stephen P. Timoshenko and Donovan H. Young “ Theory of Structures” McGraw Hill International Edition, 1968
13. http://nptel.ac.in/courses/105101086/

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
TRANSPORTATION ENGINEERING

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):3:0 : 0	SEE Marks:60	Course Code: **PC630CE**
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. To provide basic knowledge in transportation so that students can understand and solve transportation related problems and design for highway mode of transportation with focus on highway users' characteristics, geometric and pavement design, traffic engineering, and pavement construction / maintenance 2. Evaluate the fundamental theories and methods of traffic and transportation engineering, including traffic flow fundamentals, geometric design of highways, and pavement design.	1. Given the basic information on geometrical features, design horizontal and vertical alignment of highways/roads complying with IRC standards. 2. Compute key elements of traffic, present and analyse traffic data for solving mobility issues and develop a survey plan for a transportation problem through traffic studies to solve urban traffic problems. 3. Characterize the highway materials used for road construction based on quality control tests and develop a job mix formula for the given materials in field using Rothfuch method. 4. Design flexible and rigid pavements for National highways as per IRC guidelines 5. Employ various construction techniques adopted in field, identify the causes of various pavement failures and suggest remedies.

UNIT-I : HIGHWAY CLASSIFICATION, ALIGNMENT AND GEOMETRIC DESIGN

Introduction, Highway development in India, Functional classification of roads as per IRC, Road patterns,

Highway alignment – Requirements and factors controlling alignment of roads

– Factors governing geometric design ,

Highway cross-sectional elements – Carriageway, Shoulders, Medians, Right of way, Footpaths, Bus bays, Cycle tracks, Service roads, Camber. Sight distances – Stopping and overtaking sight distance.

Design of horizontal alignment – Speed, radius, super elevation, extra widening, transition curves.

Design of vertical alignment – gradient, grade compensation, summit curves and valley curves

UNIT-II : TRAFFIC ENGINEERING

Basic traffic characteristics – Volume, speed, density, headways and relationships amongst them.

Traffic studies - Objectives of traffic studies, Methods of data collection and presentation of various traffic studies such as volume studies, speed studies, speed and delay studies, origin destination studies, parking studies, accident studies. Highway capacity and Level of service concepts as per HCM.

Traffic regulation and control – Traffic signs, signals, markings and channelization. Principles of design of at-grade intersections – Simple layouts. Design of isolated signal by Webster and IRC method. Introduction to grade separated interchanges.

UNIT-III : PAVEMENT MATERIAL CHARACTERISATION

Types of pavements and materials for pavements.

Aggregates – characterizing the physical, mechanical and shape related properties of aggregate particles, durability tests and stripping tests, Blending of aggregates and job mix formula by Rothfuch method and 0.45 power gradation.

Binders – Types of paving binders – bitumen, cutbacks and emulsions, modified binders, characterization of bituminous binders : flash and fire point test, penetration test, softening point test, ductility test, Fraass breaking point test, viscosity test , Specific gravity test , elastic recovery test, separation test, simulation of short term aging using RTFOT, simulation of long term aging using PAV. Gradation of bitumen - penetration grading, Viscosity grading and performance grading. Bituminous mixture design by Marshall / Modified Marshall stability test, MS-2 procedure of computing volumetrics.

UNIT-IV : PAVEMENT DESIGN

Factors affecting pavement design –Traffic, soils and materials

Flexible pavement design using IRC 37:2018.

Rigid pavement design using IRC 58: 2015, Introduction to expansion ,

contraction, construction and longitudinal joints for jointed plain cement concrete pavements

UNIT-V: PAVEMENT CONSTRUCTION AND MAINTENANCE

Pavement construction - Construction of Water bound Macadam, Wet Mix Macadam and Granular sub base layers. Construction of Dense Bituminous macadam, Bituminous Macadam, Bituminous Concrete, Open Graded Premix Carpet, Mix Seal Surfacing, prime coat, tack coat, seal coat as per MORTH specifications, Introduction to recycled pavements.

Pavement failures and maintenance - Pavement failures – types, causes and remedies, Maintenance of bituminous pavements.

Learning Resources:

1. Khanna S.K., Justo C.E.G., Veeraraghavan A., "Highway Engineering", 10th Edition, Nem Chand & Bros, 2015
2. Kadiyali L.R., Traffic Engineering and Transportation Planning, Khanna Publishers, 2016.
3. Nicholas J. Garber Lester A. Hoel, Traffic and Highway Engineering- III edition, Cengage publication Indian edition 2006.
4. Yoder E.J., Witczak M.W., Principles of Pavement Design, John Wiley & Sons –Indian edition. 2008
5. Srinivasa Kumar R., Pavement design, Orient Blackswan Pvt. Ltd., New Delhi, 2013
6. IRC:37 : 2012 : Tentative guidelines for the design of flexible pavements
7. IRC 58 :2015: Guidelines for the design of plain jointed rigid pavements
8. IRC MORT&H- Specifications for road and bridge works, 2013 (Fifth Revision)
9. IRC 35 -2015 (Road markings), IRC 38 -1988 (Horizontal curves), IRC 53 -2012 (Accident forms), IRC 67 -2012 (Road signs), IRC:82-2015 (Maintenance of BT roads), IRC:86-1983 (geometric design standards), IRC:93-1985 (traffic signals), IRC:106-1990 (capacity), IRC:SP:23-1983 (vertical curves), IRC:SP:41-1994 (at-grade intersection)
10. MS-2 Manual by Asphalt institute
11. www.pavementinteractive.org
12. http://nptel.ac.in/courses/105105107/

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
DESIGN OF STEEL STRUCTURES

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):3 : 0 : 0	SEE Marks:60	Course Code: **PC640CE**
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to	Upon the completion of the course, students are expected to
1. understand the design philosophies of steel structures. 2. design the bolted connections and welded connections including detailing . 3. design tension members, compression members and beams by limit state design as per IS: 800- 2007. 4. estimate the loads on roof trusses and design the members of roof truss.	1. Compare the different design philosophies and employ limit state design in the design of structural elements using rolled steel sections according to IS: 800-2007 Design bolted connection using black bolts and welded connections using fillet welds, groove welds subjected to concentric loads by limit state method according to IS:800-2007 2. Design tension members using limit state design according to IS:800-2007 3. Design compression members and column bases using limit state design according to IS:800-2007 4. Design laterally supported beams using limit state design according to IS:800-2007 5. Estimate loads on roof trusses subjected to different load combinations and design purlins, members of truss using angle sections by limit state according to IS: 800-2007

UNIT-I: Materials and Specifications (Limit State Design): types of Structural Steel – classification of Rolled Steel Sections.
Design Philosophies: Elastic or working stress design, plastic or limit design and limit state design
Introduction to Limit State Design: Loads & load combinations, characteristic loads, design loads, design strength, partial safety factors for materials and loads.
Bolted Connections: Types of bolts, types of bolted joints, load transfer mechanism, modes of failure of bolted joints, design of bolted joints using ordinary black bolts for concentric loads. High strength friction grip bolts.
Welded Connections: Types of welds, types of welded joints, design of welded joints for concentric loads using fillet welds and groove welds.

UNIT-II: Design of Tension Members (Limit State Design): Introduction to tension members - applications of tension members, modes of failure, design of tension members – design of lug angles.

UNIT-III: Design of Compression Members (Limit State Design): Introduction, sections used for compression members. Effective length of compression members, slenderness ratio, types of buckling, design of compression members for axial loads with single section and built-up sections (symmetric in both directions), lacing and battening.
Design of Column Bases: Design of slab base and gusseted base for axial load

UNIT-IV: Design of Beams (Limit State Design): Introduction to plastic analysis - plastic hinge, plastic moment, shape factor. Classification of cross sections, phenomenon of lateral torsional buckling; design of laterally restrained beams. Check for web crippling, web buckling & deflection.

UNIT-V: Design of Roof trusses (Limit State Design): Types of trusses, estimation of loads - dead load, live load and wind load, design of purlins, analysis of roof trusses and design of its members with angle sections. Bracings of roof trusses.

Learning Resources:

1. Duggal S.K., "Design of Steel Structures", 2nd Edition, Tata McGraw Hill Publishing, 2014
2. Gambhir M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2013
3. Bhavikatti S.S., "Design of steel Structures", 4th Edition, I.K. International Publishing House Pvt. Ltd. 2014.
4. Subramanian N, "Design of Steel Structures", Oxford University Press, 2011.
5. IS: 800-2007: Code of Practice for General Construction in Steel, Bureau of Indian Standards, New Delhi
6. IS: 875-1987: Code of Practice for Design loads for buildings and structures, Bureau of Indian Standards, New Delhi
7. ISI Handbook No. 1 or Steel Tables by Bhavikatti S.S.
8. http://nptel.ac.in/courses/105103094/
9. www.steel-insdag.org

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
HYDROLOGY AND WATER RESOURCES ENGINEERING

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: **PC650CE**
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Describe the various aspects of reservoirs, types and functions of spill ways and energy dissipators. 2. Learn issues related to ground water flow 3. Compute rainfall, runoff and estimate floods in a catchment area.	1. Estimate floods, rainfall and runoff using different methods for peak flow estimation and plotting hydrograph 2. Explain parameters related to ground water flow and derive equations for steady, unsteady flow and yield of well 3. Estimate the capacity of reservoir incorporating sedimentation for computing life of reservoir. 4. Perform stability analysis on gravity dam for evaluating safety of the dam. 5. Evaluate the factors leading to the assessment of water power potential and layout of a hydel plant

UNIT-I: Precipitation: Hydrologic cycle, measurement of rainfall, estimation of mean rainfall over a catchment, infiltration, evaporation, runoff, factors affecting runoff, peak flow estimation, Unit Hydrograph, S-Hydrograph and variations.

UNIT-II: Ground Water Hydrology: Zoning of subsurface, Aquifer properties affecting ground water, well Hydraulics - Steady radial flow in to a well in confined and un confined aquifers, Unsteady flow into a confined aquifer, spacing of wells, well loss, yield of a well, Constant level pumping and recuperation test.

UNIT-III: Reservoir Planning: Selection of site, zones of storage in a reservoir, storage capacity analysis, Reservoir sedimentation, Flood routing through retarding basin, Estimation of life of a reservoir

UNIT-IV: Storage Head Works: Types of dams, advantages & disadvantages, selection criteria, economical height of the dam, gravity dam, forces acting on dam, stability analysis, elementary profile and practical profile, low and high gravity dams.

UNIT-V: Water Power Engineering: Demand and generation, different heads, load factor, capacity factor and utilization factor , Assessment of water power potential, primary and secondary power, components and types of Hydel plants, Pen stocks & Surge Tanks, Power house layout, components and their functions.

Learning Resources:

1. Modi P.N. "Irrigation Water Resources and Water Power Engineering", standard Book house, New Delhi, 2008
2. Garg S.K., "Irrigation Engineering & Hydralic Structures", Khanna Publishers, 2009
3. Dandekar & Sarma, Water Power Engineering, Vikas Publishers, 2009
4. http://nptel.ac.in/courses/105104103/

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
FINISHING SCHOOL-IV: TECHNICAL SKILLS

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):1: 0 : 0	SEE Marks:40	Course Code: **MC610CE**
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to introduce	Upon the completion of the course, students are expected to
1. Software package on construction management technology 2. Element wise assembling the parts of a building.	1. Plan, execute and monitor large scale projects execution using Project Management software. 2. Execute Exterior designing plans and graphs of building by using Building Information Modelling Software.

Project Management Software

UNIT-I

- Training on Installation and setup
- Introduction to project management
- Introduction to primavera
- Enterprise project structure (EPS)

UNIT-II

- Organisational breakdown structure
- Project codes and values
- Global and project calendars

Building Information Modelling

- Project Units
- Levels
- Walls
- Basic Wall creation
- Basic creation of Plan

- Wall
- Compound Wall
- Modify Wall
- Stacked Wall

- Adding a project (W/O project architect)
- Work breakdown structure (WBS)
- Wall Opening

UNIT-III

- Budget and establishing spending plan
- Activity codes and values
- Work products and documents
- Activities, relationships and scheduling
- Constraints
- Door
- Window
- Floor
- Ceiling
- Roof
- Components

UNIT-IV

- Grouping and filtering activities
- Bars and layouts
- Resources, roles and costs
- Baseline plan
- 3D modelling
- Stair
- Railing

UNIT-V

- Monitoring the current schedule
- Threshold monitoring and issues
- Project tracking and reports
- Role plays and Use cases discussion
- Views
- Section View
- Elevation View
- Camera View
- Visualization
- Rendering
- Walkthrough
- Print

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF CIVIL ENGINEERING
TRANSPORTATION ENGINEERING LAB

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):0: 0 : 2	SEE Marks:60	Course Code: **PC631CE**
Credits : 1	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Impart basic knowledge to carry out quality control lab tests for roads in highway engineering practice. 2. Conduct quality control in road construction as per standards and introduce the concepts of design mix 3. Conduct traffic studies and present the data for transportation engineering applications	1. Perform experiments on aggregates and bitumen on their suitability for road construction 2. Understand basic traffic studies for transportation planning and design. 3. Conduct tests on job mix formula and Marshall stability 4. Practice working as a team member and lead a team 5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively

LIST OF EXPERIMENTS

A) Tests on road aggregates

1. Aggregate crushing value test
2. Los Angeles abrasion test
3. Aggregate impact value test
4. Aggregate shape test (flakiness & elongation)
5. Water absorption & Specific gravity of aggregates
6. Job mix formula by Rothfuch Method

B) Tests on bitumen

7. Penetration Test
8. Ductility Test
9. Elastic Recovery Test
10. Softening point Test
11. Specific gravity Test
12. Viscosity Test
13. Flash and fire point Test

C) Traffic Studies

14. Classified Traffic volume study at mid blocks
15. Spot Speed Study
16. Origin & Destination studies

D) Miscellaneous Tests (demonstration only)

18. Bitumen extraction test
19. Design of Bitumen mixture by Marshall stability test

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment of experiments			18

Duration of Internal Test: 2 Hours

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

DEPARTMENT OF CIVIL ENGINEERING
Computer Applications-I Lab

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):0:0: 2	SEE Marks:50	Course Code: **PC641CE**
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Use a structural Design software for analysis and design of RCC and Steel Structures.	1. Perform analysis and design of RCC beams and frames subjected to various loads using a structural design software. 2. Design of G + 2 residential building subjected to dead load and live load combination using software. 3. Design an RCC multi-storeyed building subjected to DL, LL and wind load combination using software. 4. Perform analysis and design of an RCC multi-storeyed building subjected to DL, LL, WL and seismic load combination using software 5. Perform analysis and design of steel trusses and frames subjected to various loads using software.

LIST OF EXPERIMENTS

Introduction of a structural analysis and design software for the design of RCC and Steel structures:

RCC Design:

Perform analysis and design of:

1. Beams

2. Plane frames
3. Space frames
4. G+2 residential building
5. Wind analysis of multistoried structures
6. Seismic analysis of multi-storeyed structures

Steel Design:

Perform analysis and design of:

7. Trusses
8. Frames

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment of experiments			18
Duration of Internal Test: 2 Hours			

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

DEPARTMENT OF CIVIL ENGINEERING
Environmental Engineering Lab

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week):0:0: 2	SEE Marks:50	Course Code: **PC651CE**
Credits : 1	CIE Marks:30	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Familiarize with the procedures of water quality analysis. 2. Estimate the Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) for sewage samples. 3. Calculate the coagulant dosage for reduction of turbidity and disinfection dosage. 4. Practice working of flame photometer.	1. Analyse the water samples for the determination of alkalinity, hardness, chlorides, calcium, pH, contents of sodium and potassium in water using flame photometer, total dissolved solids and turbidity. 2. Estimate the Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) in sewage samples. 3. Calculate the coagulant dosage for reducing the turbidity and disinfection dosage. 4. Practice working as a team member and lead a team 5. Demonstrate professional behaviour in conducting the experiments and presenting the results effectively

LIST OF EXPERIMENTS

1. Determination of Alkalinity.
2. Determination of Hardness.
3. Determination of Chlorides.
4. Determination of Acidity.
5. Determination of Variation of pH.
6. Determination of Dissolved Oxygen

7. Determination of Biochemical Oxygen Demand (B.O.D.)
8. Determination of total dissolved solids
9. Determination of residual chlorine.
10. Determination of turbidity
11. Determination of coagulant dose – Jar test.
12. Determination of Chemical Oxygen Demand (C.O.D.)
13. Determination of Sodium & Potassium present in water using flame photometer (Demonstration).

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for assessment of experiments			18

Duration of Internal Test: 2 Hours

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN B.E. VI SEMESTER (2019-20)

Dept	Title	Code	credits
Civil	Project Management	OE610CE	3
CSE	Introduction to Databases	OE610CS	3
CSE	Introduction to Operating Systems	OE620CS	3
ECE	Basics of Communication Systems	OE610EC	3
ECE	Internet of Things and Applications	OE620EC	3
ECE	Introduction to Mobile Communications	OE630EC	3
EEE	Basics of Power Systems	OE610EE	3
IT	Introduction to Web Application Development	OE610IT	3
IT	Introduction to Machine Learning	OE620IT	3
Mech.	Introduction to Automobile Engineering	OE610ME	3
Mech.	Additive Manufacturing and its applications	OE620ME	3
Physics	Fundamentals of Nano Materials and Their Applications	U19OE610PH	3

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

DEPARTMENT OF CIVIL ENGINEERING
PROJECT MANAGEMENT (Open Elective-V)

SYLLABUS FOR B.E. VI SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks:60	Course Code: **OE610CE**
Credits : 3	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objectives of the course are to	Upon the completion of the course, students are expected to
1. Learn the concept of project management along with functions and objectives. 2. Understand the various techniques used for project planning such as bar charts, CPM, PERT and crashing of networks. 3. Acquire knowledge on various types of contracts, tenders.	1. Understand the objectives, functions and principles of management in projects. 2. Practice the network techniques like CPM and PERT for better planning and scheduling of engineering works. 3. Analyse the importance of cost and time in network analysis and planning the work accordingly. 4. Knowledge on Contracts, Tenders, and Work orders related to the projects. 5. Interpret the concept of Linear Programming and solve problems by Graphical and Simplex methods.

UNIT-I

Significance of Project Management: Objectives and functions of project management, management team, principles of organization and types of organisation.

UNIT-II

Project Planning: Project Planning, bar charts, network techniques in project management - CPM Expected likely, pessimistic and optimistic time, normal distribution curve and network problems of PERT

UNIT-III

Time Cost Analysis: Cost time analysis in network planning, updating

UNIT-IV

Contracts: Introduction, types of contracts and their advantages and disadvantages, conditions of contracts, Introduction to Indian contract act.

Tender: Tender form, Tender Documents, Tender Notice, Work Order.

UNIT-V

Linear programming and optimization Techniques: Introduction to optimization – Linear programming, Importance of optimization, Simple problems on formulation of LP, Graphical method, Simplex method.

Learning Resources:

1. Srinath L.S., PERT and CPM: Principles and Application, East-West Press, 2001.
2. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2009
3. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 2006.
4. http://nptel.ac.in/courses/

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
INTRODUCTION TO DATABASES (OPEN ELECTIVE-V)

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **OE610CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Identify different issues involved in the design and implementation of a database system.	1 Identify the functional components of database management system. Create conceptual data model using Entity Relationship Diagram
2 Understand transaction processing.	2 Transform a conceptual data model into a relational model
	3 Design database using normalization techniques
	4 Apply indexing and hashing techniques for effective data retrieval
	5 Explain transaction processing.

UNIT-I

Introduction: Database System Application, Purpose of Database Systems, View of Data, Database Languages, Relational Database, Database Architecture, Database Users and Administrators.

Database Design and E-R Model: Overview of the Design Process, the E-R Model, Constraints, E-R Diagrams.

UNIT-II

Relational Model: Structure of Relation Database, Relational Algebra Operations, Modification of the Database.

Structured Query Language: Introduction, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Views, Join Expressions.

UNIT-III

Relational Database Design: Features of Good Relational Designs, Atomic Domains and first Normal form, Decomposition Using Functional Dependencies, functional Dependency Theory.

UNIT-IV

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, B-Tree Files, Multiple – Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing.

UNIT-V

Transaction Management: Transaction concept, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation and Atomicity, Serializability, Recoverability.

Learning Resources:

1. Abraham Silberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.
2. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System , 8th Edition(2006) Pearson Education.
3. Raghu Ramakrishna, and Johannes Gehrke, Database Management Systems, 3rd Edition(2003), McGraw Hill.
4. RamezElmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 4th Edition(2006), Pearson Education.
5. Peter rob, Carlos coronel, Database Systems, (2007), Thomoson.
6. http://nptel.ac.in/courses/106106093/

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

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

Duration of Internal Tests : 90 Minutes

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

Department of Computer Science & Engineering
INTRODUCTION TO OPERATING SYSTEMS (OPEN ELECTIVE-V)

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **OE620CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Understand different Operating system Structures and Services.	1 Compare CPU scheduling algorithms and Operating system structures
	2 Apply different techniques for Main memory management.
	3 Describe file management techniques.
	4 Describe deadlock handling methods
	5 Analyze Disk scheduling algorithms and I/O operation implementation techniques

UNIT-I:

Introduction to operating systems: Definition, User view and System view of the Operating system, Operating system structure, Operating system services.
Process: Process concept, Process Control block, Context switching.
CPU Scheduling: Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Round Robin

UNIT-II:

Memory Management: Swapping, Contiguous memory allocation: Fixed Partitioning, Variable Partitioning. Non-Contiguous memory allocation: Paging.
Virtual memory: Demand paging, Page replacement Algorithms: FIFO, Optimal, LRU.

UNIT –III:

File System Interface: File Concept, Access Methods: Sequential, Indexed, and Direct
File System Implementation: File-System Structure, Allocation Methods: Contiguous, Linked and Indexed.

UNIT –IV:
Deadlocks: System model, deadlock characterization: Mutual Exclusion, Hold and Wait,
Non pre-emption, Circular wait. Deadlock Prevention, Deadlock Avoidance: Banker's algorithm.

UNIT-V:
Device Management: Disk Scheduling algorithms: FCFS, SSTF, SCAN.
I/O System: I/O hardware, Application I/O Interface.

Learning Resources:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, 9th Edition (2016), Wiley India.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, 2nd Edition (2001), Pearson Education, Asia.
3. Dhananjay, Dhamdhere.M, *Operating System-concept based approach*, 3rd edition (2009), Tata McGraw Hill, Asia
4. Robet Love: *Linux Kernel Development*, (2004)Pearson Education
5. Richard Stevens, Stephen Rago, *Advanced Programming in the UNIX Environment*, 3rd Edition(2013), Pearson Education
6. http://web.stanford.edu/~ouster/cgi-bin/cs140-spring19/index.php
7. https://nptel.ac.in/courses/106106144/

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BASICS OF COMMUNICATION SYSTEMS (OPEN ELECTIVE)

SYLLABUS FOR B.E. VI - SEMESTER (for other branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **OE610EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Distinguish between Amplitude and Frequency modulation methods and their application in Communication Receivers 2. Explain why multiplexing methods are necessary in communications and compare FDM with TDM 3. Compare and contrast FSK and BPSK modulation schemes employed in digital data transmission 4. Draw the block diagrams of different types of communication systems and explain their operation	On completion of the course, students will be able to 1. Identify the Radio frequency spectrum and the bands of different types of radio systems 2. Analyze the power, efficiency and transmission bandwidth of Amplitude and Frequency Modulated signals. 3. Convert the Radio frequency to Intermediate frequency and explain the operation of Superheterodyne Receiver. 4. Compare and contrast Frequency Division Multiplexing and Time Division Multiplexing used in the Communication systems 5. Detect and correct errors present in bit stream data using parity check 6. Explain the basic principles of different types of communication systems.

UNIT - I :

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

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

UNIT - II :

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

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

UNIT - III :

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

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

UNIT - IV :

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

UNIT - V :

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

INTERNET OF THINGS AND APPLICATIONS (OPEN ELECTIVE)

SYLLABUS FOR B.E. VI - SEMESTER (for other branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **OE620EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. The purpose of this course is to impart knowledge on IoT Architecture, practical constrains. 2. To study various protocols And to study their implementations	On completion of the course, students will be able to 1. Understand the Architectural Overview of IoT 2. Enumerate the need and the challenges in Real World Design Constraints 3. Compare various IoT Protocols. 4. Build basic IoT applications using Raspberry Pi. 5. Understand IoT usage in various applications.

UNIT - I : OVERVIEW

Introduction to IoT – Improving Quality of life.

IoT-An Architectural Overview, M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT.

UNIT - II : Real-World Design Constraints

Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. Power Management in IoT device, Power conditioning using energy harvesting.

UNIT - III : IOT PROTOCOLS

Introduction to MQTT, Quality of services in MQTT,standards and security in MQTT.

Introduction and implementation of AMQP, Implementation of CoAP and MDNS.

UNIT - IV : Device for IoT

Choice of Microcontroller, Introduction to Raspberry Pi ,Features of Pi, Programming platform, Phython programming for Pi. Building basic IoT Applications using Raspberry Pi.

UNIT - V : IoT case studies

Smart Cities and Smart Homes, Connected Vehicles, Agriculture, Healthcare, Activity Monitoring.

Learning Resources:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications
5. https://nptel.ac.in/courses/106105166/5
6. https://nptel.ac.in/courses/108108098/4

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

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

Duration of Internal Tests: 90 Minutes

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

INTRODUCTION TO MOBILE COMMUNICATIONS

(OPEN ELECTIVE)

SYLLABUS FOR B.E. VI - SEMESTER (for other branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **OE630EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the technology trends changing from generation to generation. 2. To have an insight into the various propagation models and the effects of fading. 3. To understand the multiple access techniques and Mobile communication system specifications.	On completion of the course, students will be able to 1. Analyze various methodologies to improve the cellular capacity. 2. Identify various Propagation effects. 3. Identify the effects of fading and multi path propagation. 4. Categorize various multiple access techniques for Mobile Communications. 5. Analyze the specifications of GSM based Mobile Communication Systems.

UNIT - I:

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communications, Examples of Wireless Communications Systems, Trends in Cellular Radio and Personal Communication Systems.

The Cellular Concept – System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage and Capacity in Cellular Systems.

UNIT - II:

Mobile Radio Propagation - Large Scale Path Loss: Introduction to Radio wave Propagation, Free Space Propagation Model, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering.

UNIT - III:

Mobile Radio Propagation - Small Scale Fading and Multipath: Small Scale Multipath Propagation, Small – Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions.

UNIT -IV:

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Space Division Multiple Access (SDMA).

UNIT -V:

Wireless Systems and Standards: Global System for Mobile (GSM) – Services and features, System architecture, GSM Radio subsystem, channel types, Frame structure for GSM.

Learning Resources:

1. Theodore S. Rappaport, Wireless Communications Principles and Practices, 2nd edition, Pearson Education.
2. David Tse, Pramodh Viswanath, Fundamentals of Wireless Communication, 2005, Cambridge University Press.
3. Name of the course: Introduction to Wireless and Cellular Communications
   Course url: https://swayam.gov.in/nd1_noc19_ee48/preview

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

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

Duration of Internal Tests: 90 Minutes

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

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
BASICS OF POWER SYSTEMS
(Open Elective – V)

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P(Hrs./week):3:0:0	SEE Marks: 60	Course Code: **OE610EE**
Credits :3	CIE Marks: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. To comprehend the various ways of power generation.	1. Identify the various and major ways of generation of power in India.
2. To determine the per unit cost of a power generating station.	2. Estimate the energy generated by hydel generating station.
	3. Calculate the capacitance value for p.f. improvement.
	4. Assess the tariffs of domestic and commercial loads

UNIT – I: **Thermal Power Station:**
Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components- Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers, choice of site for steam power station.

UNIT – II :**Hydro Power Stations:**
Power Generation Principles, Choice of site, layout and various parts of generating stations, Estimation of power in Hydel, flow duration curve, hydrograph, mass curve etc., Types of Hydel stations.

UNIT – III: Nuclear Power Stations:
Nuclear Fission and Chain reaction, Principle of operation of Nuclear reactor, Reactor Components- Moderators, Control rods, Reflectors and Coolants

UNIT – IV: Economics of Power Generation:
Load Curve, Load duration curve, load demand and diversity factors, base load and peak load operation, types of costs and depreciation fund calculations, Tariffs-Desirable characteristics of a tariff, types of tariff

UNIT – V: Power Factor:
Disadvantages of low p.f, Causes of low P.F, Power factor improvement, Methods of power factor improvement, Numerical problems.

Learning Resources:

1. C.L. Wadhwa, Electrical Power Systems, Wiley Eastern Ltd. 5th Edition, 2005
2. C.L. Wadhwa, Generation, Distribution and Utilisation of Electrical Energy, Wiley Eastern Ltd., 5th Edition, 2005
3. S.N.Singh- Electrical Power Generation, Transmission and Distribution-Prentice Hall pvt.ltd. New-2003.

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

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

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

DEPARTMENT OF INFORMATION TECHNOLOGY
INTRODUCTION TO WEB APPLICATION DEVELOPMENT
(OPEN ELECTIVE-V)
SYLLABUS FOR B.E VI- SEMESTER
(Common for CIVIL, ECE, EEE & MECH)

L:T:P(Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **OE610IT**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
	On completion of the course, students will be able to
Acquire basic skills for designing static and dynamic Web Applications using HTML, CSS , Java script and PHP.	1. Design a static web pages using HTML, CSS. 2. Use JavaScript for creating dynamic web pages and client side validation. 3. Use built-in functions of PHP to perform server side validations and sending emails. 4. Use built-in functions of PHP to connect , query and fetch results from a database. 5. Build a PHP application using an MVC Framework.

UNIT-I: Introduction
Introduction: World Wide Web, Web Browsers, Web Servers, URL, HTTP, TCP Port. HTML: Standard HTML document structure, Basic Tags, Images, Hypertext Links, Lists, Tables, Frames. CSS: In-line style sheets, Internal Style sheets and External Style sheets.

UNIT-II: Basics of JavaScript
JavaScript: Introduction, Basics of JavaScript-variables, data types and operators, Control Structures, Arrays, Functions, HTML Forms, Events and event handling.

UNIT-III: Basics of PHP
Basics of PHP: Data Types, Variables and Operators, Control Structures: If else, Switch Case. Loop: For, ForEach, While, Do While. Functions in PHP, PHP Forms, Cookies & Sessions, File Processing.

UNIT-IV: Advanced PHP

Advanced PHP: PHP E-Mail, Filters, Database Access, OOPS in PHP. Application using PHP.

UNIT-V: Introduction to MVC

Introduction to Model View Controller Architecture, Building Application using a PHP Framework, Testing and Deploying a PHP application.

Learning Resources:

1. "Web Technologies", 7th Edition, Uttam K.Roy,2012.
2. "Internet & World Wide Web How to Program", 5/e, Paul J. Deitel, Harvey M. Deitel, Abbey Deitel,2012.

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

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

Duration of Internal Tests : 90 Minutes

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

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO MACHINE LEARNING

(OPEN ELECTIVE-V)

SYLLABUS FOR B.E VI- SEMESTER
(Common for CIVIL, ECE, EEE & MECH)

L:T:P (Hrs./week): 3:0:0	SEE Marks :60	Course Code: **OE620IT**
Credits : 3	CIE Marks: 40	Duration of SEE :3Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
	On completion of the course, students will be able to
Introduce the fundamental concepts and approaches in Artificial intelligence and Machine Learning field to effectively apply techniques to the real-world problems.	1. Demonstrate knowledge of the Artificial intelligence and machine learning literature. 2. Apply an appropriate algorithm for a given problem. 3. Apply machine learning techniques in the design of computer systems. 4. Prove basic results in the theory of learning 5. Explain the relative strengths and weaknesses of different machine learning methods and approaches.

UNIT-I:
Introduction to AIML: Foundations of AI, Sub areas of AI, Applications. Introduction to learning, Types of Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning.
Supervised learning: Linear Regression, Logistic Regression.

UNIT-II:
Supervised Non-parametric learning: Introduction to Decision Trees, K-Nearest Neighbor, Feature Selection.
Supervised Parametric learning: Support Vector Machine, Kernel function and Kernel SVM.

UNIT-III:
Supervised Parametric learning (Neural networks): Perceptron, Multilayer Neural Network, Backpropagation.

UNIT-IV:
Supervised Parametric Bayesian learning: Introduction, Naive Bayes Classification, Bayesian Network.

UNIT-V:
Unsupervised leaning: Clustering, K-means Clustering, DBSCAN

Learning Resources:

1. Tom Mitchell, Machine Learning, First Edition, McGraw-Hill, 1997
2. Christopher Bishop. Pattern Recognition and Machine Learning. Second Edition.
3. EthemAlpaydin , Introduction to Machine Learning, Second Edition
4. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2008.
5. http://nptel.ac.in/courses/106106139/

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

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

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

INTRODUCTION TO AUTOMOBILE ENGINEERING (OE-V)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **OE610ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES *On completion of the course, students will be able to*
1 familiarize the student with the different types of automobiles and engine components.	1 identify types of Automobiles and engine components.
2 impart adequate knowledge in fuel supply, cooling, lubrication systems of IC engines.	2 describe the engine fuel system in petrol and Diesel engines, cooling, lubrication systems.
3 understand the steering geometry, steering mechanism and types of suspension systems.	3 describe the steering mechanism, suspension systems
4 gain the knowledge about working of clutch, gear mechanism, brakes	4 analyse the working principle and operation of clutch, gear mechanism and brakes.
5 make the student conversant with types of wheels, tyres and pollution control techniques.	5 know the pollutants from automobile and pollution control techniques and identify the types of wheels, tyres.

UNIT-I: Introduction: Types of automobiles: Hybrid Vehicles, Electrical, gas and Fuel cell vehicles. Chassis and body, Lay out of transmission system, Engine components: cylinder block, cylinder head, crankcase, crank shaft and cam shaft. Types of IC Engines: SI and CI engines, two stroke and four stroke engines.

UNIT-II: Fuel system: Fuel supply system for SI engines and CI engines. Simple carburettor, Introduction to Multipoint fuel injection system (**MPFI**) of petrol engines and Introduction to **CRDI** system for diesel engines.

Cooling system: air cooling, water cooling: Thermo syphon, pump circulation system.

Lubrication system: Petroil System, splash system, pressure lubrication: Wet sump and Dry Sump.

Ignition system: Battery Ignition System, Magneto Ignition System and Electronic Ignition System.

UNIT-III: Suspension system: Rigid axle, Independent suspension system:Double wish bone type, Macpherson strut system, Air suspension system.
Steering system: front axle, wheel alignment, steering geometry: camber, caster, toe-in, toe-out, steering linkage for vehicle with rigid axle front suspension, steering linkage for vehicle with independent front suspension, Ackermann steering mechanism.

UNIT –IV: Power Train: Single plate clutch, Multi plate clutch. Manual Gear Box: sliding mesh gear box, constant mesh gear box, synchromesh gear box and Automatic Gear Box. Working principle of Differential.
Brakes: Types: Drum and Disc brakes, Mechanical and Hydraulic Brakes, **ABS** system.

UNIT –V: Wheels and Tyres: Types of Wheels: wire wheels, disc wheels, alloy wheels. Types of tyres: Tube type, tubeless type. **SRS** Airbag system.
Automobile Emissions and control: Automobile pollutants and sources of pollution. Pollution Control Techniques: Catalytic Converters, EGR and PCV. Bharath emission Norms.

Learning Resources:

1. Crouse & Anglin, "Automobile Engineering", 10th Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi,. 2007.
2. Kirpal Singh, "Automobile Engineering", Vol.I& II, 13th Edition, Standard Publishers, New Delhi 2013.
3. R.B Gupta, "Automobile Engineering" 7th Edition, Satya Prakashan, New Delhi, 2015.
4. Joseph Heitner, "Automotive Mechanics", 2nd Edition, Affiliated East West Pvt. Ltd., 2013.
5. C.P. Nakra, "Basic Automobile Engineering", 7th Edition, Dhanpat Rai Publishing C (P) Ltd., 2016.

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

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

ADDITIVE MANUFACTURING AND ITS APPLICATIONS
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **OE620ME**
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*	
The objective of the course is to understand the fundamentals of various additive manufacturing technologies and their applications in Engineering Industry.	1	understand the fundamentals of prototyping.
	2	study the principle, process, advantages and limitations of liquid based AM systems.
	3	study the principle, process, advantages and limitations of solid based AM systems.
	4	study the principle, process, advantages and limitations of powder based AM systems.
	5	study the applications of AMT in various engineering industries.

UNIT-I

Introduction, Prototyping fundamentals, Historical development, Fundamentals of rapid prototyping, Advantages of Rapid prototyping, Commonly used terms, Rapid prototyping process chain, 3D modelling, Data Conversion, and transmission, Checking and preparing, Building, Post processing, AM data formats, Classification of AM process

UNIT-II

Liquid based AM systems: Stereolithography Apparatus(SLA): Models and specifications, Process, Working principle, photopolymers, Photopolymerisation, Layering technology, laser and laser scanning, Applications, Advantages and disadvantages, Case studies

Solid ground curing(SGC): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies

UNIT-III

Solid based AM systems: Laminated object manufacturing(LOM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

UNIT-IV

Powder based AM systems: Selective laser sintering(SLS): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

Three dimensional printing (3DP): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

UNIT-V

Applications of AM systems: Applications in aerospace industry, automotive industry, jewellery industry, coin industry, GIS Application, arts and architecture.

RP medical and bio engineering Application: planning and simulation of complex surgery, customized implant and prosthesis , design and production of medical devices, forensic science and anthropology, visualization of bio-molecules.

Learning Resources:

1. Chua C.K., Leong K.F. abd LIM C.S., "World Rapid prototyping : Principles and Applications", 2nd Editon, Scientific Publications, 2004
2. D.T.Pham and S.S.Dimov, "Rapid Manufacturing", Springer, 2001.
3. AmithabaGhose, "Rapid prototyping", Eastern Law House, 1997.
4. Paul F.Jacobs, "Stereolithography and other RP & M Technologies", ASME Press, 1996.
5. Paul F.Jacobs, "Rapid Prototyping & Manufacturing", ASME Press, 1996.

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

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2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

Ibrahimbagh, Hyderabad-500 031, Telangana State

DEPARTMENT OF PHYSICS

FUNDAMENTALS OF NANO MATERIALS AND THEIR APPLICATIONS

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U19OE610PH
Credits :03	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Students will be able to learn	*At the end of the course students will be*
1. Learn bulk, thin and nano structures 2. Acquire knowledge on properties of nano materials 3. Appreciate fabrication techniques of nano materials 4. Learn nanomaterial characterization techniques. 5. Appreciate application of nano materials	1. Distinguish bulk, thin and nano materials from the point of view of size effects 2. List various properties of nano materials 3. Narrate various nanonmaterial preparation techniques 4. Describe necessary characterization techniques of nano materials 5. Write various applications of CNTS and nano structures.

UNIT-I: INTRODUCTION TO NANOSCIENCE

Distinction between bulk, thin and nano materials-surface to volume ratio, change of electronic structure, density of states of thin and nano materials, quantum confinement-quantum size effect-Reduction of dimensionality, Quantum wells (two dimensional),Quantum wires (one dimensional), Quantum dots (zero dimensional).

UNIT-II: PROPERTIES OF NANO MATERIALS

Material behavior at reduced dimensions, Electrical properties: conductivity, surface scattering, ballistic transport Magnetic properties: Soft magnetic Nano-crystalline alloy, Permanent magnetic Nano-crystalline materials, Giant Magnetic Resonance, chemical properties, optical properties and thermal properties.

UNIT-III: NANOMATERIALS PREPARATION TECHNIQUES

Bottom-up and Top-down approaches. Preparation techniques Bottom-up methods: Physical Vapor Deposition, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method ,Self assembly, top-down methods: ball milling, Nano-lithography, Spark plasma sintering.

UNIT-IV: NANO MATERIAL CHARACTERIZATION TECHNIQUES

Characterization techniques: X-Ray Diffraction (XRD), working principles of Scanning Electron Microscopy (SEM), working of Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM).

UNIT-V: CARBON NANO MATERIALS AND APPLICATIONS

Graphene, Elementary ideas on Carbon nanotubes, CNTs, types of CNTs-single wall (SWCNT) and multiwall carbon nanotubes (MWCNT), properties and characteristics of SWCNTS and MWCNTS. Applications of nano materials in Cosmetic sector, Food, Agricultural, engineering, automotive Industry, environment, medical applications, Textiles, Paints, Energy, space Applications, nanosensors and nanocatalysts.

Learning Resources:

1. B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, Text Book of Nano Science and Nano Technology –University Press (India) 2013
2. K.K. Chattopadhyay and A.N. Benerjee, Introduction to Nanoscience and Nanotechnology , PHI, 2019

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

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2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes