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B.E. – Civil Engineering

I to VIII Semester Curriculum and Syllabus

R-2017

B.E. – Civil Engineering

SEMESTER I										
Sl. No.	Course Code	Course Title	Category	L	T	P	C	CA	FE	Total
1	UICH001	Technical English	**HS**	2	0	1	3	40	60	100
2	UICH005	Civil Engineers and Society	**HS**	2	0	0	2	40	60	100
3	UICM001	Engineering Mathematics - I	**BS**	3	1	0	4	40	60	100
4	UICP001	Engineering Physics	**BS**	3	0	1	4	40	60	100
5	UICC001	Engineering Chemistry	**BS**	3	0	1	4	40	60	100
6	UICE004	Computing Fundamentals and C programming	**ES**	2	0	2	4	40	60	100
7	UICE010	Engineering Graphics	**ES**	2	0	2	4	40	60	100
			Total	**17**	**1**	**7**	**25**			

SEMESTER II										
Sl. No.	Course Code	Course Title	Category	L	T	P	C	CA	FE	Total
1	UICH002	Business English	**HS**	2	0	1	3	40	60	100
2	UICM002	Engineering Mathematics - II	**BS**	3	1	0	4	40	60	100
3	UICC002	Ecology and Environmental Science	**BS**	3	0	0	3	40	60	100
4	UICE002	Basic Electrical and Electronics Engineering	**ES**	4	0	0	4	40	60	100
5	UICE012	Engineering Mechanics	**ES**	3	0	1	4	40	60	100
6	UICE018	Smart Materials	**ES**	3	0	0	3	40	60	100
7	UICE005	Computer Aided Drafting and Modelling Laboratory	**ES**	0	0	2	2	40	60	100
8	UICE015	Engineering Workshop	**ES**	0	0	2	2	40	60	100
			Total	**18**	**1**	**6**	**25**			

SEMESTER III										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UICM003	Transforms and Partial Differential Equations	**BS**	3	1	0	4	40	60	100
2	UICE011	Engineering Geology	**ES**	3	0	0	3	40	60	100
3	UICE016	Mechanics of Solids	**ES**	3	0	1	4	40	60	100
4	UCEC001	Civil Engineering Materials	**PCC**	2	0	1	3	40	60	100
5	UCEC002	Fluid Mechanics and Machinery	**PCC**	3	0	1	4	40	60	100
6	UCEC003	Plane and Geodetic Surveying	**PCC**	3	0	1	4	40	60	100
7	UCEC004	Building Drawing	**PCC**	0	0	2	2	40	60	100
			Total	**17**	**1**	**6**	**24**			

SEMESTER IV										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UICH003	Economics for Engineers	**HS**	3	0	0	3	40	60	100
2	UICM004	Numerical Methods	**BS**	3	1	0	4	40	60	100
3	UCEC005	Mechanics of Materials	**PCC**	3	0	0	3	40	60	100
4	UCEC006	Geo-Technical Engineering - I	**PCC**	2	0	1	3	40	60	100
5	UCEC007	Environmental Engineering –I	**PCC**	2	0	1	3	40	60	100
6	UCEC008	Transportation Engineering	**PCC**	2	0	1	3	40	60	100
7	UCEC101	Concrete Technology	**PCC**	2	0	0	2	40	60	100
8	xxxxxxx	Generic Elective – I	**GE**	3	0	0	3	40	60	100
			Total	**20**	**1**	**3**	**24**			

SEMESTER V										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UCEC009	Structural Analysis	**PCC**	3	1	0	4	40	60	100
2	UCEC010	Geo-Technical Engineering – II	**PCC**	3	0	0	3	40	60	100
3	UCEC011	Design of Steel Structures	**PCC**	3	0	0	3	40	60	100
4	UCEC012	Water Resources Engineering	**PCC**	3	0	0	3	40	60	100
5	UCEC013	Environmental Engineering - II	**PCC**	2	0	1	3	40	60	100
6	UCEC102	Concrete Structures - I	**PCC**	3	0	0	3	40	60	100
7	xxxxxxx	Generic Elective – II	**GE**	3	0	0	3	40	60	100
8	xxxxxxx	Professional Elective – I	**PE**	3	0	0	3	40	60	100
9	UCEC023	Survey Camp	**PCC**	0	0	0	1	100	0	100
			Total	**23**	**1**	**1**	**26**			

SEMESTER VI										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UCEC015	Matrix Methods in Structural Analysis	**PCC**	3	1	0	4	40	60	100
2	UCEC103	Concrete Structures – II	**PCC**	3	0	0	3	40	60	100
3	UCEC104	Design and Drawing of Concrete and Steel Structures	**PCC**	0	0	2	2	40	60	100
4	UCEC105	Prestressed Concrete Structures	**PCC**	3	0	0	3	40	60	100
5	xxxxxxx	Professional Elective - II	**PE**	3	0	0	3	40	60	100
6	xxxxxxx	Professional Elective – III	**PE**	3	0	0	3	40	60	100
7	UCEC017	Industrial Design Project (Course Work)	**IDP**	4	0	0	4	40	60	100
8	UCEC018	Industrial Design Project (Practical)	**IDP**	0	0	2	2	40	60	100
			Total	**19**	**1**	**4**	**24**			

SEMESTER VII										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UCEC019	Estimation and Quantity Surveying	**PCC**	2	0	1	3	40	60	100
2	UCEC106	Basics of Structural Dynamics and Earthquake Resistant Structures	**PCC**	3	0	0	3	40	60	100
3	xxxxxxx	Generic Elective – III	**GE**	3	0	0	3	40	60	100
4	xxxxxxx	Generic Elective – IV	**GE**	3	0	0	3	40	60	100
5	xxxxxxx	Professional Elective - IV	**PE**	3	0	0	3	40	60	100
6	UCEC020	Industrial Design Project (Phase – II)	**IDP**	0	0	6	6	60	40	100
7	UCEC021	Final Year Project (Phase – I)	**FYP**	0	0	2	2	60	40	100
			Total	**14**	**0**	**9**	**23**			

SEMESTER VIII										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	xxxxxxx	Professional Elective – V	**PE**	3	0	0	3	40	60	100
2	xxxxxxx	Professional Elective - VI	**PE**	3	0	0	3	40	60	100
3	UCEC022	Final Year Project (Phase- II)	**FYP**	0	0	6	6	60	40	100
			Total	**6**	**0**	**6**	**12**			

PROFESSIONAL ELECTIVE – I & II										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UCEE001	Hydrology	**PE**	3	0	0	3	40	60	100
2	UCEE002	Remote Sensing and GIS	**PE**	3	0	0	3	40	60	100
3	UCEE003	Simulation Modelling in Water Resources	**PE**	3	0	0	3	40	60	100
4	UCEE004	Industrial Waste Management	**PE**	3	0	0	3	40	60	100
5	UCEE005	Air Pollution and Control Engineering	**PE**	3	0	0	3	40	60	100
6	UCEE006	Solid Waste Management	**PE**	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE – III & IV										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UCEE007	Intelligent Transport System	**PE**	3	0	0	3	40	60	100
2	UCEE008	Sociology and Economics in Civil Engineering	**PE**	3	0	0	3	40	60	100
3	UCEE009	Housing Planning and Management	**PE**	3	0	0	3	40	60	100
4	UCEE010	Earth and Rock fill Dam	**PE**	3	0	0	3	40	60	100
5	UCEE011	Pavement Engineering	**PE**	3	0	0	3	40	60	100
6	UCEE012	Ground Improvement Techniques	**PE**	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE – V & VI										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UCEE013	Maintenance, Repairs and Rehabilitation of Structures	**PE**	3	0	0	3	40	60	100
2	UCEE014	Prefabricated Structures	**PE**	3	0	0	3	40	60	100
3	UCEE015	Construction Project Management	**PE**	3	0	0	3	40	60	100
4	UCEE016	Advanced Construction Techniques	**PE**	3	0	0	3	40	60	100
5	UCEE101	Finite Element Analysis	**PE**	3	0	0	3	40	60	100
6	UCEE102	Industrial Structures	**PE**	3	0	0	3	40	60	100
7	UCEE103	Computer Aided Design of Structures	**PE**	3	0	0	3	40	60	100
8	UCEE104	Design of Energy Efficient Building	**PE**	3	0	0	3	40	60	100

LIST OF GENERIC ELECTIVES

OFFERED BY DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING										
Sl. No.	Course Code	Course Title	Category	L	T	P	C	CA	FE	Total
1	UCSG001	Fundamentals of Information Security	GE	3	0	0	3	40	60	100
2	UCSG002	Introduction to Computer Networks	GE	3	0	0	3	40	60	100
3	UCSG003	Introduction to Software Engineering	GE	3	0	0	3	40	60	100
4	UCSG004	Python Programming for Engineers	GE	3	0	0	3	40	60	100
5	UCSG005	Soft Computing and its Application	GE	3	0	0	3	40	60	100

OFFERED BY DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING										
Sl. No.	Course Code	Course Title	Category	L	T	P	C	CA	FE	Total
1	UEEG001	Energy Management Systems	GE	3	0	0	3	40	60	100
2	UEEG002	Medical Instrumentation	GE	3	0	0	3	40	60	100
3	UEEG003	PLC Programming	GE	3	0	0	3	40	60	100
4	UEEG004	Renewable Energy Systems	GE	3	0	0	3	40	60	100
5	UEEG0025	Virtual Instrumentation & Data Acquisition	GE	3	0	0	3	40	60	100

OFFERED BY DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING										
Sl. No.	Course Code	Course Title	Category	L	T	P	C	CA	FE	Total
1	UECG001	Electronic Measurements	GE	3	0	0	3	40	60	100
2	UECG002	Introduction to Embedded Systems	GE	3	0	0	3	40	60	100
3	UECG003	Microcontrollers and its Applications	GE	3	0	0	3	40	60	100
4	UECG004	Nano Electronics and Sensors	GE	3	0	0	3	40	60	100
5	UECG005	Principles of VLSI Systems	GE	3	0	0	3	40	60	100

OFFERED BY DEPARTMENT OF MECHANICAL ENGINEERING										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UMEG001	Automotive Fundamentals	**GE**	3	0	0	3	40	60	100
2	UMEG002	Computer Aided Design	**GE**	3	0	0	3	40	60	100
3	UMEG003	Introduction to Power Plant Engineering	**GE**	3	0	0	3	40	60	100
4	UMEG004	Introduction to Robotics	**GE**	3	0	0	3	40	60	100
5	UMEG005	3D Printing	**GE**	3	0	0	3	40	60	100

OFFERED BY DEPARTMENT OF INFORMATION TECHNOLOGY										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UITG001	Big Data Analytics and its Applications	**GE**	3	0	0	3	40	60	100
2	UITG002	Cloud Computing Fundamentals	**GE**	3	0	0	3	40	60	100
3	UITG003	Fundamentals of Internet of Things	**GE**	3	0	0	3	40	60	100
4	UITG004	Introduction to Data Base Management System	**GE**	3	0	0	3	40	60	100
5	UITG005	Web Interface Design and Development	**GE**	3	0	0	3	40	60	100

OFFERED BY DEPARTMENT OF SCIENCE AND HUMANITIES										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UGCC001	Indian Constitution, Democracy and World Affairs	**GE**	3	0	0	3	40	60	100
2	UGCC002	Fundamentals of Astrophysics	**GE**	3	0	0	3	40	60	100
3	UGCC003	Fundamentals of Biochemistry	**GE**	3	0	0	3	40	60	100
4	UGCC004	Statistical Inferences and Applications	**GE**	3	0	0	3	40	60	100

OFFERED BY DEPARTMENT OF MASTER OF BUSINESS ADMINISTRATION										
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CA**	**FE**	**Total**
1	UMGG001	Entrepreneurship Development	**GE**	3	0	0	3	40	60	100
2	UMGG002	Intellectual Property Rights	**GE**	3	0	0	3	40	60	100
3	UMGG003	Total Quality Management	**GE**	3	0	0	3	40	60	100
4	UMGG004	Human Rights And Human Values	**GE**	3	0	0	3	40	60	100
5	UMGG005	Supply Chain Management And Logistics	**GE**	3	0	0	3	40	60	100

CREDIT DISTRIBUTION

S. No	**Course Work - Subject Area**	**Credits/Semester**								**Credits Total**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
1	Humanities and Social Sciences (HS)	5	3	-	3	-	-	-	-	**11**
2	Basic Sciences*(BS)*	12	7	4	4	-	-	-	-	**27**
3	Engineering Sciences *(ES)*	8	15	7	-	-	-	-	-	**30**
4	Professional Core Courses (PCC)	-	-	13	14	20	6	6	-	**59**
5	Professional Elective Courses (PEC)	-	-	-	-	3	6	3	6	**18**
6	Generic Electives *(GE)*	-	-	-	3	3	-	6	-	**12**
7	Industrial Design Project (IDP) / Final Year Project Work (FYP)	-	-	-	-	-	12	8	6	**26**
Total		**25**	**25**	**24**	**24**	**26**	**24**	**23**	**12**	**183**

SEMESTER - I

UICH001	TECHNICAL ENGLISH	L	T	P	C
		2	0	1	3

Course Objectives

- To equip the students with the LSRW skills.
- To perceive the art of effective speaking and writing through various grammar exercises.
- To enable the act of interpreting Comprehension passages and essays.
- To develop test-taking strategies and skills for BEC Prelims.

Course Content

Importance of Communication

Listening: Listening to audio files and answering the given questions, Speaking: Self-introduction and Peer introduction, Speak about one's native place/important festivals/ History of a company, Reading: Note-Making on the given text, Skimming and Scanning for specific information, Writing: Parts of Speech, Word formation with Prefix and Suffix, Regular and Irregular verbs, Articles, Tenses, Countable and Uncountable Nouns, Set phrases for e-mails and Letters, sending a group e- mail.

Formal Communication

Listening: Listening to motivational talks / TED talks, Telephone Conversation (information about orders and deliveries), Speaking: Role-Play (a telephone call to a supplier), Describing a product and how it is advertised, Reading: Reading Comprehension exercise, Writing: Subject-Verb Agreement, Comparative Adjectives, Expansion of Compound Nouns, Prepositions, Formal letter writing (A letter responding to an invitation and promotional letters), E-mail to Manager.

Writing Strategies

Listening: Listening to statistical information (short extracts), Speaking: Role-Play (Making an appointment), Planning a sales event, Reading: Finding key points from the given text, Writing: Cause and Effect, Compare and Contrast, Gerunds and Infinitives, Paragraph writing, Instructions, E-mail (confirming a booking/requesting information), Translating and interpreting written or spoken content from one language to another.

Presentation Skills

Listening: Listening to Mock Group Discussion and evaluating, Speaking: Making presentation on the given topic / Describing the given data and trends, Sales talk (Discussing on company information), Reading: Interpreting pictures of Flowchart/Pie chart/Bar chart, Writing: Letter to express an interest in a new product, Process Description, Recommendations.

Technical Communication

Listening: Listening to interviews (frequently asked questions and responses), Speaking: Giving impromptu talks, Giving a summary of an article, Reading: Business Report, E-mail to a Recruitment Agency, Writing: Resume Writing, Purpose and Function, Wh- questions.

List of Exercises

1. Self and Peer Introduction
2. Telephonic Conversation
3. Listening Comprehension
4. Oral Presentation on a given topic
5. Mock interview

References

1. Ian wood, Anne Williams with Anna Cowper, "Pass Cambridge BEC Preliminary", 2nd Edition, Cengage Learning, 2015.
2. Whitby, Norman, "Business Benchmark Pre-intermediate to Intermediate Business preliminary", 1st Edition Cambridge University Press, 2014.
3. Rizvi M.Ashraf, "Effective Technical Communication", Tata McGraw-Hill Publishing Company Limited, 4th Edition, 2010.
4. Gerson Sharon J, Steven M.Gerson, "Technical Writing-Process and Product", Pearson Education Pvt. Ltd. 3rd Edition, 2009.
5. Douglas Stone, Bruce Patton, Sheila Heen, "Difficult Conversations: How to Discuss" Kindle Publication, 1st Edition, 2010.

UICH005	CIVIL ENGINEERS AND SOCIETY	L	T	P	C
		2	0	0	2

Course Objectives

- To expose students about Graduate Attributes, Civil Engineering Education and their responsibilities in the society.
- To guide the students to evaluate and discuss issues related to code of ethics.

Course Content

Engineering – Definition – Engineering Education – Graduate Attributes – Engineering functions – Role and Responsibilities of Engineers – Professional Societies and their codes of ethics – Constraints in Engineering.

Introduction to Civil Engineering – Branches of Civil Engineering – Scope of Civil Engineering – Types of Infrastructures – Impact of infrastructural development on economy and environment of country – Role of Civil Engineer in Society.

The concept of profession – Importance of ethics in Engineering – Role of codes of ethics – Professional responsibilities of Engineers – Overview of ethical theories and applications – Social and ethical responsibilities of Engineers – Whistle blowing and beyond, Case studies.

Reliability, risk and safety – Risk management – Engineering and the environment – Ethics and the environment – Sustainable Engineering – Global and Cultural considerations – Specific case examples – Challengers Incidents.

References

1. Kim Strom Gottfried, “Straight Talk about Professional Ethics”, Lyceum Books, 2nd Edition, 2014.
2. Mike W. Martin, Roland Schinzinger, “Ethics In Engineering”, McGraw Hill, 2005.
3. Ramesh Chandra Das, “Social, Health, and Environmental Infrastructures for Economic Growth”, IGI Global Disseminator of Knowledge, 2017
4. Rebecca Mirsky and John Schaufelberger, “Professional Ethics for the Construction Industry” RICS, USA, 2014.
5. Kenneth K. Humphreys, “What Every Engineer Should Know about Ethics”, CRC Press, 1999.

UICM001	ENGINEERING MATHEMATICS - I	L	T	P	C
		3	1	0	4

Course Objectives

- Able to adopt the concepts of Eigenvalues and Eigenvectors of matrices and apply them in various Engineering fields.
- Able to make the student knowledgeable in the area of infinite series and their convergence.
- Able to develop the skills of solving problems under several variable calculus.

Course Content

Matrices

Eigen value and Eigenvectors – Properties – Cayley-Hamilton Theorem (without proof) - Diagonalization – Similarity and Orthogonal transformation – Quadratic forms – Orthogonal reduction– Applications.

Sequences and Infinite Series

Sequences – Convergence of series – General properties – Series of positive terms – Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test) – Alternating series – Series of positive and negative terms – Leibnitz rule (statement only) - Absolute and conditional convergence.

Differential Calculus

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes - Evolute as envelope of normals – Applications.

Functions of Several Variables

Partial derivatives – Total derivative – Differentiation of implicit functions – Change of variables – Jacobian – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

Multiple Integrals

Double Integrals (Cartesian and polar) – Change of order of integration – Change of variables – Triple integrals – Transformation – Spherical and Cylindrical coordinates – Applications to area and volume.

References

1. Grewal. B.S, “Higher Engineering Mathematics”, 43rd Edition, Khanna Publications, Delhi, 2016.
2. Srimanta Paul and Subodh C. Bhunia, “Engineering Mathematics”, Oxford University Press, 1st Edition, 2015.
3. Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Edition, Wiley India, 2016.
4. James Stewart, “Calculus, Early Transcendental”, 7th Edition, Cengage learning, New Delhi, 2015.
5. Ramana B.V, “Higher Engineering Mathematics”, 6th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2010.
6. Ravish R Singh and Mukul Bhatt, “Engineering Mathematics”, 1st Edition, Tata McGraw Hill Education, New Delhi, 2016.

UICP001	ENGINEERING PHYSICS	L	T	P	C
		3	0	1	4

Course Objectives

- To understand the properties of materials, concept of quantum mechanics, working of lasers and fiber optics.
- To perform experiments using semiconductor, laser and fiber optics.
- To apply the concept of physics in different engineering application and to solve scientific problems.

Course Content

Properties of Matter

Hooke's law - stress - strain diagram - modulus of elasticity - elastic constants - relation between elastic moduli - Poisson's ratio - expressions for Poisson's ratio in terms of elastic constants - work done in stretching a wire - work done in twisting a wire - Applications: twisting couple on a cylinder, rigidity modulus of a wire.

Thermal Physics

Fundamental modes of heat transfer - effect of temperature on thermal conductivity of solids, liquids and gases - Conduction in solids - Lee's disc method - flow of heat through a compound material - Application: Thermal insulation of buildings.

Principles of Quantum Mechanics

Blackbody Radiation - Quantum of energy and Planck's hypothesis - Rayleigh-Jeans Law -Photoelectric effect - Concept of photon mass - Compton effect - de-Broglie hypothesis - Davisson and Germer experiment - Schrödinger wave equations - Applications: Particle in one dimensional box - Quantum tunneling in p-n junction diode.

Laser and Fiber optics

Spontaneous emission - stimulated emission - Types of laser - pumping - ND-YAG laser - CO_2 laser-semiconductor laser (homojunction and heterojunction) - Engineering applications: holography (construction and reconstruction of hologram).Fiber optic materials - concept of light flow – modes of

propagation of light through different media - types of optical fibers – acceptance angle - Applications: Temperature and displacement sensor, Fiber endoscope.

Fundamentals of Nanoscience

Introduction – classification – density of states of 1D, 2D, 3D – morphology (particles, nanowires and nanotubes) – Optical properties.

List of Experiments

1. Determination of moment of inertia of the metallic disc and rigidity modulus of the wire using Torsional Pendulum.
2. Determination of thermal conductivity of a bad conductor using Lee's Disc method.
3. Determination of energy band gap in a semiconductor by using p-n junction diode.
4. Determination of thickness of a thin sheet of paper using Air Wedge method.
5. (i) Determination of particle size using laser.
   (ii) Determination of acceptance angle and numerical aperture of an optical fiber.

References

1. Dattu R Joshi, "Engineering Physics", Tata McGraw Hill Publications, New Delhi, 1st Edition, 2010.
2. Vijayakumar S, "Engineering Physics – I", Wiley Publications, 2014.
3. Halliday, Resnick and Walker, "Fundamentals of Physics", Wiley International Publications, Extended 10th Edition, 2015.
4. Edelstein A S and Cammearata R C., "Nanomaterials: Synthesis, Properties and Applications",Institute of Physics Publishing, Bristol and Philadelphia, 1996.
5. Marikani A, "Engineering Physics", PHI Learning Pvt. Ltd., New Delhi, 2nd Edition, 2013.
6. Mani Naidu S, "Engineering Physics", Pearson Education, Delhi, 2010.

UICC001	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	1	4

Course Objectives

- To learn the electrochemical principles, various types of electrodes and understand the mechanism of corrosion and prevention methods.
- To conversant with Principles and generation of energy in batteries and fuel cells.
- To acquire knowledge on the quality of water and its treatment method for domestics and industrial applications.
- To be able to develop experimental skill in quantitative analysis of materials by volumetric and instrumental methods and apply in engineering industries.

Course Content

Electrochemistry

Electrolytic Conductance – Specific, Equivalent and Molar conductance (Definitions only) – Conductance measurement – Conductometric titrations – Electrochemical cells – Nernst Equation (Problems), Electrode potential – Electrodes – Standard Hydrogen Electrode (SHE), Saturated Calomel Electrode (SCE) and Glass Electrode – EMF Series and its applications.

Corrosion science and prevention

Definition – Impact in Industries – Mechanism (Dry and Electrochemical) – Types – Galvanic and Differential aeration corrosion – Corrosion prevention – Impressed current technique, sacrificial anodic protection – Inhibitors – Synthetic and Green.

Batteries

Batteries – Characteristics – Current, Power, Capacity, Classification of batteries – Primary (Alkaline battery) – Secondary batteries (Lead acid and Nickel – Cadmium) and Flow batteries (Hydrogen – Oxygen and Methanol – Oxygen fuel cells) – Modern batteries – Lithium Ion batteries – Applications.

Water treatment

Importance of water – Water sources – Impurities – Carbonate and Non Carbonate Hardness (simple problems) – Potable water and its specifications, Steps involved in treatment of potable water –

Disinfection of potable water by Chlorination, UV treatment and Ozonization. Industrial water treatment methods – Demineralisation – Desalination (Reverse Osmosis).

Polymers

Polymers – Types (Natural and Synthetic) – Functionality – Degree of polymerization – Engineering polymers – Acrylonitrile Butadiene Styrene (ABS) , Polystyrene and Teflon – Structure and Industrial applications – Compounding of plastics – Fabrication – Extrusion moulding only – Management of waste plastics.

List of Experiments

1. Estimation of acidity of industrial effluent by conductometric titration.
2. Estimation of iron by Potentiometry.
3. Determination of corrosion rate by weight loss method.
4. Determination of percentage purity of bleaching powder.
5. Estimation of hardness of water by Complexometric method.

References

1. Vairam.S, Kalyani P, Suba Ramesh, "Engineering Chemistry", John Wiley & Sons, 1st Edition, 2016.
2. Palanna O G, "Engineering Chemistry", Tata McGraw – Hill Education, 1st Edition, 2009.
3. Renu Bapna and Renu Gupta, Engineering Chemistry, Macmillan Publishers India, 1st Edition, 2010.
4. Jeffery G. H, and Basset J., "Vogel's text book of quantitative chemical analysis", Prentice Hall, 5th Edition, 2012.
5. Qanungo, Kushal, "Engineering Chemistry", Prentice Hall India Limited, 1st Edition, 2009.

UICE004	COMPUTING FUNDAMENTALS AND C PROGRAMMING	L	T	P	C
		2	0	2	4

Course Objectives

- To learn the fundamental components and operating principles of digital computer
- To find solutions to complex engineering problems by developing computer programs using C language

Course Content

Introduction

Generation and Classification of Computers - Basic Organization of a Computer – Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

C Programming Basics

Problem formulation – Problem Solving – Introduction to C programming – fundamentals – structure of a C program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in C – Managing Input and Output operations – Decision Making and Branching – Looping statements – Solution to complex Engineering, Scientific and statistical problems using appropriate control flow statements.

Arrays and Strings

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String – String operations – String Arrays. Simple programs – sorting – searching – matrix operations.

Functions and Pointers

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers – Definition – Initialization – Pointers arithmetic – Pointers and arrays – Example Problems.

Structures and Unions

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Union – Programs using structures and Unions – Storage classes, Pre-processor directives – File Handling.

List of Experiments

1. Experiments to solve domain specific complex Engineering problems using appropriate control structures and expressions. Proper formatting of Input / Output statements is mandatory.
2. Experiments to manipulate strings using appropriate data types and string handling functions.
3. Experiments to represent and perform operations on domain specific Engineering, Scientific data using arrays. Proper formatting of Input / Output statements is mandatory.
4. Experiments to represent and perform memory aware operations on domain specific Engineering, Scientific data using pointers. Proper formatting of Input / Output statements is mandatory.
5. Experiments to demonstrate the power of modular programming using functions.
6. Experiments to represent complex Scientific data using user defined data types and perform operations to generate required output.
7. Experiments that demonstrate the use of operating system files to store output of computation through C language file handling features.

References

1. Paul Deitel, Harvey Deitel "C How to Program", 3rd Edition, Pearson Education Asia.
2. Behrouz A. Forouzan, Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", 3rd Edition, Course Technology Inc, 2005.
3. E Balagurusamy, "Computing Fundamentals and C Programming", McGraw Hill Education; 1st Edition, 2008
4. Greg Perry, Dean Miller, "C Programming Absolute Beginner's Guide", 3rd Edition, Pearson Education, 2014.
5. Henry S. Warren Jr., "Hacker's Delight", 2nd Edition, Pearson Education, 2013.

UICE010	ENGINEERING GRAPHICS	L	T	P	C
		3	1	0	4

Course Objective

- To enable the students to communicate the concepts, ideas, and basic designs through graphical representations as per standards and
- Impart knowledge to interpret engineering drawings.

Course Content

Geometrical Constructions and Free Hand Sketching

Lettering – Types of lines – Dimensioning – Geometrical constructions – Principles of Orthographic projection – Orthographic projection of simple Engineering components using first angle Projection – Free Hand sketching only.

Projection of Points, Lines and Plane Surfaces

Projection of points – Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method – Projection of planes inclined to both the principal planes by rotating object method.

Projection of Solids

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

Projection of Sectioned Solids and Development of Surfaces

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

Isometric and Perspective Projections

Principles of isometric projection – isometric scale – isometric projections of simple solids and Truncated solids – Prisms, pyramids, cylinders, cones – combination of two solid objects in simple vertical positions – Perspective projection of simple solids by visual ray method. Introduction to CAD and their use

References

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
2. Gary Bertoline., and Eric Wiebe.,"Technical Graphics Communication",McGraw–Hill, 4th Edition, 2009.
3. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 2014.
4. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2009.
5. David E. Goetsch, William S. Chalk, Raymond L. Rickman and John Nelson, "Technical Drawing and Engineering Communication", Delmar Cengage Learning, 6th Edition, 2005.

SEMESTER - II

UICH002	BUSINESS ENGLISH	L	T	P	C
		2	0	1	3

Course Objectives

- To comprehend the techniques of correspondence that improves the listening and drafting skills.
- To facilitate the students to use the language efficiently at work place.
- To improve decision making and problem solving skills through reading practice.
- To develop test-taking strategies and skills for BEC Vantage.

Course Content

Fundamentals of Communication

Listening : Listening and noting specific information, Speaking : Extempore, Taking and Leaving Voice mail messages, Reading: scanning for gist and specific information, Writing: Discourse Markers, Writing a message, a memo (communicating policies, procedures within an organisation) or an email (business e-mail for appointment, enquiry, email with attachments).

Written Business Correspondence

Listening: Listening to identify topic, context, function, Speaking: Talking about present circumstances, past experiences and future plans, Reading: understanding text structure, Writing: Formal Letters (Calling for quotation, Placing Order, Complaint, Enquiry), Reports, Introduction to Blogs, Tweet, Social Networks, If Conditional, Adverbs / Adjectives.

Career Oriented Communication

Listening: Listening to different Accents/Intonation/Vowels/Consonants, Speaking: speculating about Brands and Marketing, Reading: Reading Comprehension (vocabulary and structure), Writing: Tag Questions, Modal Verbs, Writing Business Correspondence (explaining, apologising, reassuring, complaining), Reports (describing, summarizing), Preparation of Agenda, Notices and Minutes of the Meeting.

Oral Presentation and Professional Speaking

Listening: Listening for details and main ideas, Speaking: Giving personal information, Making a longer speech, Giving information and expressing and justifying opinions, Reading: Reading different kinds of texts, Interpretation of Graphics, Writing: Active / Passive Voice, Set phrases (requesting information, agreeing to requests).

Personality Development

Listening: Listening to longer conversations/Monologues, Speaking: Expressing and justifying opinions, speculating, comparing and contrasting, agreeing and disagreeing. A 'mini-presentation' on a business theme, Reading: understanding sentence structure and finding errors, Writing: Reported Speech, Proposals (describing, summarizing, recommending, persuading).

List of Exercises

1. Extempore
2. Social Networking
3. Technical Presentation
4. Marketing a product
5. Group Discussion

References

1. Ian wood, Anne Williams with Anna Cowper, "Pass Cambridge BEC Vantage", 2nd Edition, Cengage Learning, 2015.
2. Brook-Hart, Guy, "Business Benchmark", Cambridge University Press, 1st Edition, 2014.
3. Stephen E. Lucas, "The Art of Public Speaking", Mc Graw Hill Publications, 5th Edition, 2014.
4. Emilia Hardman, "Active Listening 101: How to turn down your volume to turn up your Communication Skills", Kindle Publication, 2nd Edition, 2012.
5. Patterson, Kerry, Joseph Grenny, Ron McMillan, Al Switzler, "Crucial Conversations Tools for Talking When Stakes Are High", Kindle Publication, 2nd Edition, 2011.

UICM002	ENGINEERING MATHEMATICS - II	L	T	P	C
		3	1	0	4

Course Objectives

- Able to build mathematical models in terms of differential equations.
- Able to acquaint the knowledge on vector calculus, complex variables, conformal mappings and complex integration to solve various Engineering problems.
- Able to understand Laplace transform to represent system dynamic models and evaluate their time responses.

Course Content

Ordinary Differential Equations

Homogeneous linear ODEs of second order – Non-homogeneous linear ODEs of second order with constant coefficients – Euler Cauchy's equation – Wronskian – Variation of Parameters – Modeling with Differential Equations.

Vector Calculus

Gradient of scalar field – Directional derivative – Divergence of vector field – Curl of vector field – Line integrals – Green's theorem in the plane – Gauss divergence theorem – Stokes theorem – (without proof) – Applications.

Analytic Functions

Analytic functions – Necessary and sufficient conditions – Cauchy-Riemann equations – Properties – Construction of analytic functions – Bilinear transformation – Conformal mapping: $w = z + c$, $w = c\,z$, $w = 1/z$ – Applications.

Complex Integration

Complex integration – Statement of Cauchy's integral theorem – Cauchy's integral formula – Laurent's series expansions – Singular points – Residues – Cauchy's residue theorem – Application of complex integration : Evaluation of real Integrals.

Laplace Transforms

Laplace transform – Properties – Initial and Final Value Theorems – Periodic functions: sine wave, square and triangular waves - Inverse Laplace Transform – Simple system dynamic models - Transfer Functions – Poles and Zeroes - Response of First-Order Systems - Solution of RC Free, Step and Sinusoidal Responses - Convolution theorem.

References

1. Grewal. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2016.
2. Srimanta Paul and Subodh C. Bhunia, "Engineering Mathematics", Oxford University Press, 1st Edition, 2015.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India, 2016.
4. Ravish R Singh and Mukul Bhatt, "Engineering Mathematics", 1st Edition, Tata McGraw Hill Education, New Delhi, 2016.
5. Ramana B.V, "Higher Engineering Mathematics", 6th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2010.

UICC002	ECOLOGY AND ENVIRONMENTAL SCIENCES	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the functions of natural system and various man induced activities that are affecting the nature in a destructive manner.
- To generate awareness about strategies to control, reduce and monitor all environmental threats.
- To manage various natural resources to attain environmental sustainability.

Course Content

Ecology and Biodiversity

Ecology – ecosystem – biomes – physical and chemical components of ecosystem – biological components of ecosystem – forest ecosystem – desert ecosystem and pond ecosystem – Energy flow in ecosystem – nitrogen cycle – carbon dioxide cycle – phosphorous cycle – food pyramid – Ecological succession – types. – Biodiversity – need for biodiversity – values of biodiversity – hot spots of biodiversity – endangered and endemic species – Conservation of biodiversity – in – situ and ex – situ conservation.

Natural Resources

Earth structure – internal and external earth processes – plate tectonics – erosion – weathering – deforestation – Anomalous properties of water – hydrological cycle – Effect of modern agriculture – fertilizers & pesticides – eutrophication – biomagnifications – Land degradation and mining – Desertification – soil erosion, methods of control of soil erosion – Renewable energy resources – wind, solar, geothermal, tidal and OTEC.

Case Studies: Loss of Forest Cover and Land Degradation in Jhum in India's North – East, Bijolia mining area in Rajasthan, Landslides in Nilgiris.

Environmental Pollution

Introduction – Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste management : causes, effects and control measures of municipal solid wastes – Role of an individual in prevention of pollution – pollution case studies.

Case Studies: Polluted Rivers – Ganga, Yamuna and Noyyal River, Foundries in Haora, Zero waste management in Vellore.

Environmental Threats

Acid rain, greenhouse effect, global warming – Disaster management – flood, drought, earthquake, tsunami – Threats to biodiversity – destruction of habitat, habitat fragmentation, hunting, over exploitation, man – wildlife conflicts – The IUCN red list categories, status of threatened species.

Case Studies: Neutrino Project in Tamil Nadu.

Social Issues and Environmental Legislations

Environmental Protection – Role of Government, Legal aspects, Initiatives by Non–governmental Organizations – Sustainable development – sustainable technologies, need for energy and water conservation, rain water harvesting, water shed management, waste land reclamation, environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation – central and state pollution control boards – Public awareness, women and child welfare programs – Role of information technology in human and health.

Case Studies: Save the Children India, Rain water harvesting in urban areas – Women empowerment.

References

1. Tyler Miller G., "Environmental Science", Cengage Learning, 11th Edition, 2015.
2. Benny Joseph., "Environmental Studies", Tata McGraw Hill Education, 2nd Edition, 2008.
3. George Tchobanoglous, Howard S. Peavy, Donald R. Rowe., "Environmental Engineering", McGraw Hill Education, 1st Edition, 2013.
4. Henry J.G. and Heinke G.W., "Environmental Science and Engineering", Prentice Hall, 2nd Edition, 2007.
5. Masters G.B., "Introduction to Environmental Engineering and Science", Pearson Education, 3rd Edition, 2008.

UICE002	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		4	0	0	4

Course Objectives

- To impart the basic knowledge about the Electric and Magnetic circuits.
- To inculcate the knowledge on the AC fundamentals.
- To understand the working of various Electrical Machines and Electronic Components.

Course Content

Review of Ohm's Law & Kirchhoff's laws–series and parallel circuits, equivalent resistance, star/delta conversion. Concepts of AC circuits – RMS value, average value, form and peak factors – real and reactive power – power factor, Mesh and Nodal Analysis.

Construction, Principle of operation and characteristics of DC generator and motor, transformer, synchronous machines and Induction machines. Basic ideas about energy audit and importance of energy saving.

Introduction to different types of electronic components (Diode, Transistor), Half and full wave rectifier (Qualitative analysis only), capacitive filters, zener voltage regulator, RC coupled amplifier, frequency response, colpitts oscillator.

References

1. A Fitzgerald, Charles Kingsley, Stephen Umans, "Electric Machinery", 7th edition, McGraw–Hill, 2013.
2. Robert Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", Prentice Hall, 11th Edition 2015.
3. Mahmood Nahvi, Joseph A Edminister, "Electric Circuits", Mcgraw Hill Education, 5th Edition, 2010.
4. Bhattacharya.S.K, "Basic Electrical and Electronics Engineering", 1st Edition, Pearson Education, 2011.
5. P.S. Dhogal, "Basic Electrical Engineering – Vol. I& II", 42nd Reprint, McGraw–Hill, 2012.

UICE012	ENGINEERING MECHANICS	L	T	P	C
		3	0	1	4

Course Objectives

- To expose basic concepts of force and resultant force.
- To solve kinematics problems for particles and rigid bodies.
- To solve kinetics problems using work and energy method.

Course Content

Mechanics and its relevance, concepts of forces, laws of mechanics – Force and Force Systems – parallelogram law – Resultant forces – Composition of forces concept of free–body diagram – Solutions to practical problems related to various components and element in machines and buildings.

Rigid body – Moment, Couple, Force – Couple system – Equilibrium of rigid bodies – Types of Supports – Support reactions for beams with different types of loading – Moment of a force about a point and about an axis – Solutions to problems involving equilibrium of rigid bodies from first principles of mechanics.

Centroids, center of gravity, area moment of inertia, mass moment of inertia – Solutions for a system of distributed particles and a body of arbitrary shapes. Friction – Angle of friction and coefficient of friction – Laws of dry friction – Solutions to practical problems related to frictional forces acting on wedge, ladder, screws and belts.

Kinematics – Fundamentals of rectilinear and curvilinear motion – application of general equations – Solution to practical problems using concept of relative velocity, analytical and graphical techniques. Kinetics – Introduction – D'Alembert principle – Conservation of energy – Principles of momentum and impulse – Collision of elastic bodies.

References

1. Beer, F. P., and Johnson Jr. E. R., "Vector Mechanics for Engineers", McGraw Hill, Year of publication: 2009.
2. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", Pearson Education , 12th Edition , 2010.
3. Antony M. Bedford and Wellace Flower, "Engineering Mechanics: Statics and Dynamics", Pearson, 5th Edition, 2007.
4. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", Vikas Publishing House Pvt. Ltd., 2011.
5. Kumar, K.L., "Engineering Mechanics", Tata McGraw–Hill Publishing Company, New Delhi 2011.

UICE018	SMART MATERIALS	L	T	P	C
		3	0	0	3

Course Objectives

- To develop knowledge and understanding the engineering principles in smart sensors, actuators and transducer technology.
- To apply the techniques to produce solutions to industrial & research applications using smart structures and materials.

Course Content

Introduction

Introduction to smart Materials and structures – Instrumental structures functions and response –Sensing systems – Self–diagnosis – Signal processing consideration – Actuation systems and effectors.

Photoelastic Stress Analysis

Introduction to photoelasticity – principle – various branches of photoelasticity – birefringence – nature of light – polarization – review of colour code – fringe ordering in photoelasticity – features of isochromatic and isoclinic fringe field – positive and negative isotropic points – role of principles of soil mechanics in fringe ordering – applications in civil structures.

Electrical Measuring Techniques

Strain measuring techniques using electrical strain gauges, types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature compensation – Strain rosettes**.**

Sensors

Sensing technology – Types of sensors – Physical measurement using piezo electric strain measurement – Inductively read transducers – LVDT – Fiber optic techniques – Chemical and bio–chemical sensing in structural assessment – Absorptive chemical sensors – Spectroscopes – Fiber Optic chemical sensing systems and distributed measurement.

Actuators

Actuator techniques – Actuator and actuator materials – Piezoelectric and electrostrictive materials – Magnetostrictive materials – Shape memory alloys – Electro rheological fluids – Electromagnetic actuation – Role of actuators and actuator Materials.

References

1. Vijay K. Varadan, Vinoy.K J and Gopalakrishnan "Smart Material Systems and MEMS", Wiley Publications, 2011.
2. Culshaw B., "Smart Structures and Materials", Artec House Publications, Boston, 1996.
3. Ralph C. Smith, "Smart Materials Systems: Model Development" SIAM (Society for Industrial and Applied Mathematics), 2005.
4. Inderjit Chopra and Jayant Sirohi, "Smart Structures Theory", Cambridge University Press, 1st Edition, 2014.
5. Gandhi M.V., and Thompson, Smart Structures and Materials, Chapman & Hall Publications, New York, 1992.
6. Brijlal, Subrahmanya.N and Avadhanalu M.N, "A text book of Optics", S. Chand Publishing company, 2015.

UICE005	COMPUTER AIDED DRAFTING AND MODELLING LABORATORY	L	T	P	C
		0	0	2	2

Course Objectives

- To train the students to represent basic engineering drawings using CAD software.
- To train the students to represent Engineering components through CAD software.

List of exercises

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar) – Creation of simple figures like polygon and general multi–line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone and dimensioning.
5. Drawing front view, top view and side view of simple machine components like machine vice, coupling, screw jack, plumber block.
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall,)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, and cone.
9. Drawing isometric projection of simple objects.
10. Creation of 3–D models of simple objects and obtaining 2–D multi–view drawings from 3–D model.

References

1. Luzzader, Warren.J. and Duff John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2009.
2. George Omura, Brian C. Benton., “Mastering AutoCAD 2016 and AutoCAD LT 2016” Autodesk Official Press (SYBEX), 2015.
3. Linkan Sagar., “Autocad 2017 Training Guide”, BPB Publications, 2016.
4. Shan Tickoo, “AutoCAD 2016: A Problem–Solving Approach, Basic and Intermediate”, 22nd Edition, Auto Desk Press, 2016
5. James M. Kirkpatrick, “Basic Drafting Using Pencil Sketches and AutoCAD”, Prentice Hall, 2003.

UICE015	ENGINEERING WORKSHOP	L	T	P	C
		0	0	2	2

Course Objective

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
- To impart the knowledge of Electronic Components, functionality of measuring equipment and building circuits on PCB Board.

List of exercises

I. CIVIL ENGINEERING PRACTICE LAB

Buildings: Study of plumbing and carpentry components of residential and industrial buildings.

Plumbing Works:

a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
b) Study of pipe connections requirements for pumps and turbines.
c) Preparation of plumbing line sketches for water supply and sewage works.

Hands–on–exercise:

a) Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
b) Demonstration of plumbing requirements of high–rise buildings.

Carpentry using Power Tools only:

a) Study of the joints in roofs, doors, windows and furniture.

Hands–on–exercise:

a) Wood work, joints by sawing, planning and cutting.

II. MECHANICAL ENGINEERING PRACTICE LAB

Welding & Sheet metal

a) Preparation of arc welding of butt joints, lap joints, tee joints and corner joints.
b) Forming of simple objects using sheet metal – Trays, funnels.

Machining practices

a) Simple turning, taper turning, drilling taping practice.

Study

a) Study of centrifugal pump
b) Study of air conditioner

Demonstration

a) Demonstration on foundry operations.

III. Electrical Engineering Practice Lab

Familiarization of wiring tools, lighting and wiring accessories, various types of wiring systems; Wiring of one lamp controlled by one switch; Study of Electric shock phenomenon, precautions, preventions and earthing; Wiring of one lamp controlled by two SPDT Switch and one 3 pin plug socket independently; Familiarization of types of Fuse, MCB; Wiring of fluorescent lamp controlled by one switch from panel with MCB; Familiarization with measuring instruments to measure current, voltage and power in AC/DC circuits.

IV. Electronics Engineering Practice Lab

a) Study of Electronic Components and instruments– Resistors, Capacitors, Inductors, Diodes and multimeter.
b) Measurement of AC signal parameters (voltage, period, frequency) using CRO
c) Measurement of ripple factor of half wave rectifier and full wave rectifier.
d) Study of logic gates –AND, OR, XOR and NOT.
e) Soldering practice using general purpose PCB – Components, Devices and Circuits.

References

1. Bawa H.S., “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2007.
2. W A J Chapman, “Workshop Technology”, Oxford IBH, 2007.
3. Uppal S. L., Electrical Wiring & Estimating, Khanna Publishers——5th edition, 2003.
4. John H. Watt, Terrell Croft: American Electricians' Handbook: A Reference Book for the Practical Electrical Man – McGraw–Hill, 2002.
5. Thomas L. Floyd and Steve Wetterling, “Laboratory Exercises for Electronic Devices”, Pearson Education Limited,10th Edition, 2017.

SEMESTER - III

UICM003	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

Course Objectives

- To impart knowledge in solving first and higher order partial differential equations.
- To construct full range and half range Fourier series expansion including Harmonic analysis.
- To develop methods to solve PDE using Fourier series solutions.
- To understand different types of Fourier transform and apply them to solve complex engineering problems.
- To familiarize Z transforms techniques to solve engineering problems.

Course Content

PARTIAL DIFFERENTIAL EQUATIONS

Formation of PDE by elimination of arbitrary constants and functions – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's linear equation – Solution of second and higher order homogeneous and non-homogeneous linear equations with constant coefficients – Non linear equations of first order – Charpit's method.

FOURIER SERIES

Dirichlet's conditions – Expansion of periodic functions into Fourier series – Change of interval – Fourier series for even and odd functions – Half-range expansions – Root mean square value of a function – Parseval's identity – Harmonic analysis.

APPLICATIONS TO PARTIAL DIFFERENTIAL EQUATIONS

Classification of second order linear partial differential equations – Solutions of one dimensional wave equation – one dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions.

FOURIER TRANSFORM

Statement of Fourier integral theorem (without proof) – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Finite Fourier Sine and Cosine transform.

Z - TRANSFORM

Z-transforms – Elementary properties – Inverse Z-transform (using partial fraction and residues) – Convolution theorem – Formation of difference equations – Solution of difference equations using Z - transform.

References

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44th Edition, 2016.
2. Bali N., Goyal M, “Transforms and Partial differential equations” University Science Press, New Delhi, 2010.
3. Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley India, 10th Edition, 2016.
4. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 3rd Edition, 2012.
5. Dennis G. Zill, “Advanced Engineering Mathematics”, Jones and Bartlett Learning, LLC, an Ascend Learning Company, 6th Edition, 2016.
6. Peter V. O’Neil, “Advanced Engineering Mathematics”, Cengage Learning, Boston, USA, 8th Edition, 2016.
7. Donald. A. McQuarrie, “Mathematical Methods for Scientists and Engineers”, Viva Books Pvt. Ltd, New Delhi, 1st Edition, Reprint 2015.

UICE011	ENGINEERING GEOLOGY	L	T	P	C
		3	0	0	3

Course Objectives

- To introduce the concept of earth materials & their properties and the natural processes that act on those materials that affect manmade structures.
- To learn about geological formations.
- To introduce the basics of subsurface information and groundwater potential sites through geophysical investigations
- To apply geological principles for mitigation of natural hazards and select sites for dams and tunnels.
- To introduce the basic concept of remote sensing in geological field.

Course Content

Interrelationship between Geology and civil engineering – Branches of Geology – Earth Structure and composition. Epigene and Hypgene geological agents; rock weathering and its types; Soil formation, types, erosion and remedial measures; Geological action of rivers with different drainage patterns; Geological action of wind. Earthquakes- seismic waves, seismograph, causes, effects, seismic zones, shield areas and seismic resisting structures. Coastal zones, coastal landforms, continental shelf, continental rise, continental slope, abyssal plain, mid-oceanic ridges, trenches, tsunamis. Landslides; causes, effects and remedial measures.

Elementary knowledge on symmetry elements of important Crystallographic systems – Physical properties of minerals – Study of the following rock forming minerals – Quartz family, Felspar family, Augite, Hornblende, Biotite , Muscovite, Calcite, Garnet. Ore minerals - Haematite, Magnetite, Bauxite, Graphite, Magnesite – Clay minerals – Properties and Engineering significance. Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

Stress, strain and deformational effects on different rocks; Joints, faults, folds and unconformities their effects on civil engineering structures. Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings. Coastal protection structures. Investigation of Landslides, causes and mitigation.

References

1. S K Duggal, H K Pandey, “Engineering Geology” by Mc Graw Hill Education Pvt Ltd 2014.
2. N. Chennakesavulu, “Textbook of Engineering Geology”, 2/e, Trinity Press, 2013.
3. Subinoy Gangopadhyay, “Engineering Geology”, Oxford University Press, 2013.
4. Parbin Singh, “Engineering & General Geology”, S.K.Kataria and Sons- Delhi, 7th Edition, 2010.
5. N. Chenna Kesavulu, “Textbook of Engineering Geology”, Macmillan Publishers India Ltd, 2nd Edition, 2009.

UICE016	MECHANICS OF SOLIDS	L	T	P	C
		3	0	1	4

Course Objectives

- To learn the fundamental concept of stress, strain and deformation of structural elements.
- To analyze the concept of strain energy, principal stress and principal planes.
- To know the concept of shear force and bending moment.
- To draw the bending moment and shear force diagram and the corresponding stress distribution for different types of beams
- To gain knowledge on analysis of plane truss.

Course Content

Tension, compression and shear stresses – Hooke's law - elastic constants – compound stresses - composite bars - thermal stresses - Strain Energy due to axial force - Resilience - stresses due to impact and suddenly applied load. Beams and support conditions -Types of supports and loads - shear force and bending Moment – their diagrams for simply supported beams, cantilevers and overhanging beams. Theory of simple bending - Stress distribution at cross section due to Bending Moment and Shear - strain energy. Analysis of Plane Truss - Method of Joints - Method of sections. - Principal stress and principal planes – Mohr's circle.

List of Experiments

- Tension Test on mild steel rod
- Deflection Test on metal beam
- Shear Test
- Impact tests on metal specimen (Izod and Charpy)

References

1. Bansal R.K., "Strength of Materials", Laxmi Publications, New Delhi, Third edition, 2016.
2. Hibbler R C, "Mechanics of Materials", Pearson, Ninth edition, 2013.
3. S.S. Rattan, "Strength of Materials", Tata McGraw Hill Education, Third edition, 2011.
4. Rajput R.K., "Strength of Materials", S. Chand & Co Ltd., Sixth edition, 2011.
5. Popov E P, "Mechanics of Materials", Prentice Hall Inc., New Jersey, Second edition, 2010.

UCEC001	CIVIL ENGINEERING MATERIALS	L	T	P	C
		2	0	1	3

Course Objectives

- To introduce students to various materials commonly used in civil engineering construction and their properties.
- To understand the nature, Characteristics, performance, and behavior of civil engineering materials used in building construction
- To learn about material & product manufacturing techniques and available civil engineering materials in market.

Course Content

Stones – Types – Engineering Properties – Uses – Tests – Bricks – Types – Manufacturing Process – Tests – Cement – Types – Manufacturing Process – Tests – Applications of each types. Mortar – Classifications – Tests. Fine Aggregate – River Sand – Alternates for River Sand – Properties – Tests- Bitumen - Properties - Tests, Timber – Defects – Seasoning – Uses. Steel – Grading – Properties – Aluminum Products in Construction – GI Sheets – Applications – Water Proofing Compounds – Green Materials in Construction.

List of Experiments:

- Fineness Test on cement
- Consistency Test on cement
- Initial and final setting time on cement
- Soundness test on Brick
- Water absorption test on Brick

References

1. S.C. Rangawala, “Engineering materials”, Charotar Publishing House, New Delhi.2015.
2. Nevile A M and Brooks J J , " Concrete Technology", Prentice Hall , 2010.
3. K.S.Jagadish, B.V. Venkataraman Reddy and K.S. NanjundaRao, “Alternative Building Materials and Technologies”, New Age International (P) Ltd. Publishers,New Delhi, 2014.
4. R.K.Rajput, “Engineering Materials”, Revised Edition, S.Chand&Company Ltd, New Delhi, 2016.
5. Parbin Singh, “Civil Engineering materials”, S.K. Kataria & Sons , New Delhi, 2013.

UCEC002	FLUID MECHANICS AND MACINERY	L	T	P	C
		3	0	1	4

Course Objectives

- To understand the conservation of mass, momentum and energy for fluid flow.
- To provide insights to the hydraulic machines and introduce dimensional analysis for fluid flow problems.
- To relate the theory and practice of problems in hydraulic engineering.

Course Content

Properties of fluids- types of fluids-classification of flows - continuity equation-flow net-momentum equation.-Laminar and turbulent flow-shear stress and pressure gradient-Hagen Poiseuille equation for flow through circular pipes. Boundary layer concepts - Boundary layer thickness-Major losses - Darcy-Weisbach equation- Chezy's equation for flow through circular pipe - friction factor-Moody's diagram - minor losses - pipes in series and parallel - equivalent length -Methods of dimensional analysis - Similitude and model studies, dimensionless numbers, model laws and their applications.

Turbines, Classification of Turbines-components, working and velocity triangles,draft tubes – Performance of turbines - Specific speed and their significance- Classification of pumps, working principles – priming – head, power and efficiency - characteristic curves - Indicator diagram -Air vessel - work done against friction with and without air vessels – Rotary pumps and classification.

List of Experiments

- Flow through pipes
- Major losses and minor losses
- Characteristics curves of Pumps
- Characteristics curves of Turbines

References

1. Modi P.N. and Seth S.M., “Hydraulics and Fluid Mechanics”, 19th edition, Standard Book House, New Delhi, 2015.
2. Streeter V L and Wylie B.E, “Fluid Mechanics”, 6th edition McGraw Hill International Book Co., 2011.
3. L.Victor, Streeter and E, Benjamin Wylie, “Fluid Mechanics”, 9/e, 9th edition Tata McGraw Hill, 2013.
4. Roberson J.A and Crowe C.T., “Engineering Fluid Mechanics”. Jaico Books Mumbai, 2010.
5. Bansal, R.K., “Fluid Mechanics and Hydraulics Machines”, 9th edition, Laxmi Publications Pvt. Ltd, New Delhi, 2015.

UCEC003	PLANE AND GEODETIC SURVEYING	L	T	P	C
		3	0	1	4

Course Objectives

- To study the rudiments of plane surveying and geodetic principles to Geo informatics Engineers.
- To learn the various methods of plane and geodetic surveying to solve the real world problems.
- To illustrate the concepts of Control Surveying.
- To know the basics of Astronomical Surveying.
- To introduce the basics concept of Total station surveying.

Course Content

Classification and basic principles of surveying – Equipment and accessories for ranging and chaining – Methods of ranging – Chain traversing – Basic principles and applications of Plane Table and Compass - Levels and staves - Methods of levelling - Booking -Reduction – Curvature and refraction - Contouring.

Horizontal and vertical angle measurements - Temporary and permanent adjustments – Heights and distances–Tacheometric surveying – Trigonometric levelling – Horizontal curves in route surveying – classification, functions and requirements - methods of setting out simple curves - setting out transition curves by offsets and angles - Horizontal and vertical control- Methods - Triangulation- Base line - Instruments and accessories – Corrections - Satellite station - Traversing. Concepts of measurements and errors – adjustment methods – least square methods – angles, lengths and levelling network – simple problems.

Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems – different time systems - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour angle method Total Station: Advantages - Fundamental quantities measured – Parts and accessories – working principle – On board calculations – Field procedure - Errors and Good practices in using Total Station

GPS: System components – Signal structure – receiver components – Planning and data acquisition – Data processing - Errors in GPS - Applications.

List of Experiments

1. Chain Traversing.
2. Compass surveying.
3. Plane Table Surveying – Radiation, intersection, Traverse, Resection Leveling.
4. Setting out of curves.
5. Total station.

References

1. Jan Van Sickle, “GPS for Land Surveyors”, CRC Press, Taylor & Francis Group, 2016.
2. T.P.Kanetkar and S.V.Kulkarni, “Surveying and Levelling, Parts1 & 2”, Pune Vidyarthi Griha Prakashan, Pune, 2014.
3. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, “Surveying Vol.I & II”, Lakshmi Publications Pvt Ltd, New Delhi, 2016.
4. S.S.Bhavikatti, “Surveying Theory and Practice”, I.K.International Publishing House Pvt. Ltd, New Delhi, 2014.
5. Satheesh Gopi, “The Global Positioning System and Surveying using GPS”, Tata McGraw, 2015.

UCEC004	BUILDING DRAWING	L	T	P	C
		0	0	2	2

Course Objectives

- To understand the principles of planning for various types of buildings by incorporating building bye laws.
- To draw plan, elevation and section of residential, public and industrial buildings.
- To prepare detailed working drawings for doors, windows, roof trusses, staircases and toilets.
- To draw foundation details of a building.

Course Content

Classification of buildings - Principles of planning - Dimensions of building - Building bye laws for floor area ratio and open spaces - Orientation of buildings - Lighting and ventilation - Planning and preparing working drawings for Residential buildings (with flat roof and sloped roof)

Planning and preparing working drawings for Schools, Hostels, Hospitals and Factory buildings (single storey building with truss roof)

Detailed working drawings of building components (doors and windows) - Roof Trusses - Staircases – Toilets – Foundation details of a building

References

1. Bhavikatti S S and Chitawa M V, “Building Planning and Drawing”, IK International Publishing House, 2014.
2. Mark W Huth, “Understanding Construction Drawings”, Cengage Learning, 2013.
3. Rao and Swami, “Building Planning and Drawing”, Charotar Publishing House Pvt. Ltd, 8th Edition, 2015.
4. Shah M.H and Kale C.M, Patki S Y, “Building Drawing with an Integrated approach to built environment”, Tata Mc Graw Hill Publishing co. Ltd., New Delhi, 5th Edition, 2011.
5. Varghese, “Building Construction”, Prentice Hall India Learning Private Limited, 2011.

SEMESTER - IV

UICH003	ECONOMICS FOR ENGINEERS	L	T	P	C
		3	0	0	3

Course Objectives

To provide a broad understanding of various perspectives of economics.

To equip the students with necessary knowledge of economic concepts that can be applied in the engineering field.

Course Content

Introduction

Economics – Policy and scope-Micro and macroeconomics–Relationship between Science, Engineering, Technology and Economic Development.

Production and Demand

Production: Factors of production - Production Possibility Curve - Demand analysis: Law of Demand, exceptions- Elasticity of Demand.

Cost and Break even Analysis

Concepts of cost of production - different types of costs; accounting cost, sunk cost, marginal cost, opportunity cost–Break even analysis.

Capital Budgeting

Capital budgeting techniques: Payback period method, IRR and NPV –Replacement and maintenance analysis – types of maintenance – replacement of an asset.

Inflation and Globalisation

Inflation – types – measures to control inflation – fiscal policy – monetary policy - Globalisation and international business

References

1. Gupta, G.S. Managerial Economics , 2nd Edition, Tata McGraw Hill , 2013
2. Joel Dean, Managerial Economics , Prentice Hall India, 2014
3. John A. White, Kellie S. Grasman, Kenneth E. Case, Kim LaScola Needy, and David B. Pratt, Fundamentals of Engineering Economic Analysis first edition, Wiley, August 2013.
4. R.M.Joshi, International Business, Oxford higher Education 2012.
5. P K Jain and M. Y Khan, Financial Management: Text, Problems and Cases 7th Edition, McGraw Hill Education, 2014

UICM004	NUMERICAL METHODS	L	T	P	C
		3	1	0	4

Course Objectives

- To provide the mathematical foundations of numerical techniques for solving algebraic and transcendental equations.
- To apply appropriate numerical methods to estimate interpolation.
- To equip the students with numerical differentiation and numerical integration techniques.
- To acquire knowledge of numerical solution to ordinary differential equation using single and multi-step methods.
- To gain the knowledge of numerical solution for partial differential equation.

Course Content

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Solution of algebraic and transcendental equations – Fixed Point Iteration Method – Newton Raphson Method – Solutions of Linear system of equations – Gauss elimination Method – Gauss Jordan method – Gauss Seidel Method – Eigenvalue of a Matrix by Power Method – Jacobi Method. Curve fitting – Method of Least squares (Straight line and Parabola). Applications to Current and Voltages in Resistor Circuits and analysis of a statically determinate Truss.

INTERPOLATION AND APPROXIMATION

Interpolation – Lagrange's formula – Newton's divided difference formula – Newton Forward and Backward difference formula – Stirling's and Bessel's central difference formula.

NUMERICAL DIFFERENTIATION AND INTEGRATION

Newton's forward and backward difference formula for derivatives – Trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two point and Three point Gaussian quadrature formula – Double integrals using Trapezoidal and Simpson's rules – Applications to Root Mean Square current by Numerical Integration and Effective Force on the Mast of a Racing Sailboat.

NUMERICAL SOLUTION TO ORDINARY DIFFERENTIAL EQUATION

Taylor's series Method – Euler Method – Modified Euler Method – Fourth order Runge-Kutta Method for solving first order equations – Milne's Method – Adam's Method – Applications to Simulating Transient Current for an Electric Circuit and applications using Predator-Prey models and Chaos.

NUMERICAL SOLUTION TO PARTIAL DIFFERENTIAL EQUATIONS

Finite difference methods for solving second order ordinary differential equation – Classification of Partial differential equations – Finite difference solutions for one dimensional heat equation – Explicit and Implicit Methods – One dimensional Wave equation – Two dimensional Laplace's equation – Poisson's equation.

References

1. Grewal.B.S."Higher Engineering Mathematics", Khanna Publishers, 44th Edition, New Delhi 2014.
2. Steven C Chapra; Raymond P Canale "Numerical Methods For Engineers" New York, NY Mcgraw-Hill Education Corp, 7th Edition, 2015 (Applications: Unit 1,3 and 4).
3. Joe D. Hoffman, "Numerical methods for Engineers and scientists", Wiley, 2nd Edition 2015.
4. Gerald C.F. and Wheatley, P.O. "Applied Numerical Analysis", Pearson Education Asia, New Delhi, 7th Edition, 2011.
5. Kandasamy P, Thilagavathy K and Gunavathy K, "Numerical Methods", 3rd Edition S.Chand Co.Ltd, New Delhi, 2013.
6. Balagurusamy E, "Numerical Methods", McGraw Hill Education Pvt Ltd, New Delhi, 1st Edition 2016.
7. Ken F.Riley , Mike P.Hobson and Stephen J. Bence " Fundamentals of Engineering Numerical Analysis", Cambridge University Press, New Delhi, 2015.

UCEC005	MECHANICS OF MATERIALS	L	T	P	C
		3	0	0	3

Course Objectives

- To know about the methods of determining slope and deflection of beams and to gain knowledge on indeterminate structures.
- To estimate the load carrying capacity of columns and analyse cylinders & shells under internal/external pressure.
- To understand the effect of torsion on shafts and springs.

Course Content

Strain energy- Principle of virtual displacement and virtual forces - Castigliano's first theorem - Maxwell's reciprocal theorem- Statically indeterminate Structures - Propped cantilever, fixed and continuous beams - Theorem of three moments - Bending moment and shear force diagrams. Determination of deflection curve of beams- double integration - Macaulay's method - Area moment method - Conjugate beam method. Theory of torsion - Torsion of circular and hollow circular shafts and shear stresses due to torsion - closed and open coiled helical springs - leaf spring. Stresses in thin cylinders and spherical shells. Thick cylinders - Lame's equation - Shrink fit - compound cylinders. Theory of columns: Axial load- Euler's theory - Rankines formula, combined bending and axial load.

List of Experiments (Demonstration)

- Hardness Test on metal specimen.
- Deflection test on metal beam.
- Torsion test on mild steel rod.
- Compression and tension test on helical spring.

References

1. Beer and Johnston.E.R. “Mechanics of Materials”, Tata McGraw Hill Education India Private Limited; Seventh edition, 2017.
2. Russell C.Hibbeler “Mechanics of Materials”, Pearson,10th edition, 2016.
3. Barry J. Goodno and James .M. Gere “Mechanics of Materials”, CENGAGE Learning Custom Publishing; 9th edition, 2017.
4. S.S.Rattan, “Strength of Materials” Tata McGraw-Hill Education Pvt. Ltd, 2nd edition, 2016.
5. Rajput R.K., “Strength of Materials”, S. Chand Publishing, 6th Edition, 2015.

UCEC006	GEOTECHNICAL ENGINEERING – I	L	T	P	C
		2	0	1	3

Course Objectives

- To understand the index and engineering properties of soil by using phase system.
- To gain knowledge on methods of soil classification, flow of water through soils and concept of effective stress.
- To understand the principles of consolidation and shear strength.

Course Content

Origin and general types of soils - soil structure - Phase system- Identification and Classification of soils. Soil water - capillary phenomena - concept of effective and neutral stresses - Permeability - determination of coefficient of permeability in the laboratory - Seepage flow - Head, gradient, pressure - steady state flow - two dimensional - flow net. Vertical stress distribution in soil - Boussinesq equation - New mark's influence chart - principle, construction and use - pressure bulb. Compaction – Proctor Compaction Test – Field Compaction. Compressibility and consolidation - Terzaghi's one dimensional consolidation theory - pressure void ratio relationship - preconsolidation pressure - Total settlement and time rate of settlement - coefficient of consolidation. Shear strength - Mohr - Coulomb failure criterion - shear strength tests - Different drainage conditions - Shear properties of cohesionless and cohesive soils - Use of Mohr's circle - relationship between principal stresses and shear parameters.

List of Experiments

- Sieve Analysis.
- Consistency limits.
- Field Density & Compaction
- Permeability of Soil.
- Shear Tests

References

1. Gopal Ranjan and Rao P., "Basic and Applied Soil Mechanics", New Age International Pvt. Limited, New Delhi, 3rd edition, 2016.
2. Arora. K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7th edition, 2014.
3. Venkataramaiah. C, "Geotechnical Engineering", New Age International Pvt. Limited, New Delhi, 4th edition, 2012.
4. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi, 1st edition,2008.
5. M. Braja Das, "Principles of Geotechnical Engineering", Cengage Learning, 9th edition, 2016

UCEC007	ENVIRONMENTAL ENGINEERING-I	L	T	P	C
		2	0	1	3

Course Objectives

- To make the students conversant with sources and its demand of water
- To understand the basic characteristics of water and its determination
- To expose the students to understand the design of water supply lines
- To provide adequate knowledge about the water treatment processes and its design
- To have knowledge on operation and maintenance of water supply

Course Content

Water analysis -Physical, chemical and biological characteristics of water - - IS and WHO standards- Requirements of water supply - Types of demand and their contribution - rate of consumption - Forecasting the population- variation in demand pattern. Sources of water - quantitative and qualitative studies. Intakes - Channels and pipes for conveying water – Pipes - hydraulic design of pressure pipe- Materials - laying- joining- testing - pipe appurtenances- Pumps and pumping stations. Treatment plants - process of treatments – principles and design of sedimentation, coagulation and filtration – disinfection- softening - advanced water treatment. Distribution systems - analysis of distribution networks. Operation and maintenance of water supply to buildings - Rural water supply - Protected water supply - Saline water intrusion.

List of Experiments

- pH, Turbidity and Electrical conductivity
- Chlorides and Residual chlorides
- TS,TDS.TSS
- Hardness and Sulphates
- Optimum coagulant dosage jar test apparatus

References

1. Garg. S. K., “Water Supply Engineering”, Khannah Publisher, 2015.
2. Mark J. Hammer, Mark J. Hammer Jr, “Water and Waste Water Technology”, prentice hall of India, 7th edition, 2012.
3. Fair. G. M.., Geyer. J. C., “Water Supply and Waste Water disposal”, John Wiley &Sons, 2010.
4. Babbit. H. E. and Donald. J. J., “Water Supply Engineering”, McGraw Hill book Co.,5th edition,2012.

UCEC008	TRANSPORTATION ENGINEERING	L	T	P	C
		2	0	1	3

Course Objectives

- To understand the importance of transportation and the characteristics of road transport.
- To plan the geometrics of highways incorporating design considerations for various pavement types.
- To acquire knowledge on the components of railway engineering and their functions

Course Content

Introduction: Importance of transportation, different modes of transportation, characteristics of road transport, scope of highway engineering. Highway development and planning: Importance, classification of roads, road patterns, planning surveys; highway alignment and surveys.

Highway Geometric Design: Cross section elements, sight distance, design of horizontal and vertical alignment. Pavement Materials and Design: Specifications and tests on pavement materials, pavement design factors, design of flexible and rigid pavements as per IRC.

Railway Engineering - Location surveys and alignment - Permanent way - Gauges - Components - Functions and requirements - Geometric design. Track Junctions-Points and crossings - types and functions - design and layout - simple problems - Railway stations and yards. Signaling and interlocking - control systems of train movements.

List of Experiments

- Penetration test on bitumen.
- Ductility Test
- Viscosity Test
- Abrasion Test
- Impact Test

References

1. Kadiyali.L.R. “Principles and practice of Highway Engineering”, Khanna Technical Publications, Delhi, 2013.
2. Rangwala.S.C & Rangwala.K.S , “Railway Engineering”, Charotar Publishing house, 2016.
3. Vazirani.V.N & Chandola.S.P., “Transportation Engineering Vol. I & II”, Khanna Publishers, New Delhi, 2000.
4. Partha Chakraborthy & Animesh Das, “Principles of Transportation Engineering”, Prentice-Hall of India, 2011.
5. Nicholas J. Garber, Lester A. Hoel., “Traffic and Highway Engineering”, CL Engineering; 5 edition,2014.

UCEC101	CONCRETE TECHNOLOGY	L	T	P	C
		2	0	0	2

Course Objectives

- To understand the properties of concrete materials
- To study the behavior of concrete at its fresh and hardened state
- To study the concrete mix design
- To understand special concrete and their applications

Course Content

Introduction - Concrete materials - Cement: Physical tests on cement - Concrete materials - Tests on aggregates - Quality of Water for mixing and curing - use of sea water for mixing concrete. Mix Design - factors influencing mix proportion - Mix design by ACI method and I.S. code method - Design of high strength concrete. Admixtures - accelerating admixtures - Retarding admixtures - water reducing admixtures - Air entraining admixtures - coloring agent - Plasticizers. Batching - Mixing -Transportation - Placing of concrete - curing of Concrete. Strength of Concrete - Shrinkage and temperature effects - creep of concrete - permeability of concrete - durability of concrete - Corrosion - Causes and effects - remedial measures- Thermal properties of concrete - Micro cracking of concrete. Special Concrete - lightweight concrete - Fibre reinforced concrete - Polymer-polymer modified concrete - Ferrocement - Mass concrete - Ready mix concrete- Self compacting concrete- Quality control - Sampling and testing-Acceptance criteria.

References

1. Santhakumar. A.R, “Concrete Technology”, Oxford university press, 2012.
2. Shetty M.S., “Concrete Technology”, S.Chand & Company, New Delhi, 2012.
3. M.L. Gambhir, “Concrete Technology”, Tata Mc-Graw Hill Company, Noida, 2011.
4. Neville A.M “Properties of Concrete”, Pearson Education, 2012.
5. N.V.Nayak & A.K.Jain,”Handbook on Advanced Concrete Technology”, Alpha Science International Ltd, 2012.

SEMESTER - V

UCEC009	STRUCTURAL ANALYSIS	L	T	P	C
		3	1	0	4

Course Objectives

- To know about basic theory & concepts of structural analysis and the classical methods for analyzing structures.
- To gain knowledge on influence lines and arches for designing bridge structures in the construction field.
- To analyse determinate and indeterminate structures using appropriate methods.

Course Content

Moving loads for statically determinate structures -single load - two point loads - several points loads - maximum bending moment and maximum shear force - influence lines for support reactions, shear force and bending moments in beams, Influence lines for reactions in statically determinate structures - influence lines for member forces in pin jointed frames- Muller Breslau's principle and its application.

Arches – Types of arches – Analysis of three hinged, two hinged and fixed arches - Parabolic and circular arches-temperature effects. Statically indeterminate structures -Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism - Static and kinematic methods – Upper and lower bound theorems -Plastic analysis of indeterminate beams and frames. Slope Deflection and moment distribution method- Analysis of continuous beams - Sinking of Supports – Analysis of single storey and single bay rectangular vertical frames with and without sway.

References

1. Hibbeler, R.C., 'Structural Analysis', Pearson; 10th edition, 2017.
2. Wang C.K. , 'Indeterminate Structural Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2014.
3. Norris and Wilber, 'Elementary Structural Analysis' Literary Licensing, LLC, 2012.
4. G.Pandit, S.Gupta and Rajesh Gupta, 'Theory of Structures (Vol.1)', McGraw Hill Education; 1 edition , 2017.
5. Reddy .C.S, "Basic Structural Analysis", McGraw Hill Publishing Company, 2017.

UCEC010	GEOTECHNICAL ENGINEERING-II	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the common method of soil investigation and its importance in design of foundation.
- To acquire knowledge on earth pressure theories for retaining structure design.
- To understand the concept of bearing capacity and methods to estimate the safe bearing capacity for various foundation system including settlement consideration.

Course Content

Soil exploration – Planning - Augur boring – Soundings – Sampling – Plate load test, standard penetration test, static and dynamic penetrations tests – geophysical explorations – Failure of infinite and finite slopes – Types of failure – Slip circle – Friction circle – Taylor's stability – Lateral Earth Pressure – Plastic equilibrium – Rankine's theory – Active and passive earth pressure for cohesionless and cohesive soils – Earth pressure at rest – Coloumb's wedge theory – Rebhann's and Culmann's graphical solutions.

Foundation – functions and requisites – Different types – choice of foundation type – general principles of design. Bearing capacity – types of failures – Prandtl's and Terzaghi's bearing capacity analysis – Bearing capacity based on settlement and building codes.

Shallow foundation – spread footings – combined footings – trapezoidal and strap footings – Raft foundation – Contact pressure distribution – settlement analysis – Types of settlement, control.

Deep foundation – piles - types – load carrying capacity of pile – static and dynamic formula – pile load test – penetration test – pile groups – Efficiency – Feld's rule – Converse Labarre formula, Settlement of piles and pile groups – Negative skin friction – Under reamed piles.

References

1. GopalRanjan and Rao. P, "Basic and Applied Soil Mechanics", New Age International Pvt.Limited, New Delhi, 2016.
2. Arora. K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2014.
3. Venkataramaiah. C, "Geotechnical Engineering", Wiley Eastern Ltd., New Delhi, 2010.
4. Murthy. V. N. S, "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution.
5. Braja Das. M, "Fundamentals of Geotechnical Engineering", Cengage Learning, 2016.

UCEC011	DESIGN OF STEEL STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the properties of steel sections.
- To study the load combinations acting on steel structures.
- To design the various structural steel members and its connections.
- To study briefly about industrial structures and design gantry girder.

Course Content

Introduction - elastic and plastic properties of sections - permissible stresses as per IS codes - Loads on Structures - Load combinations - Partial safety for materials - Load safety factors - Types of connections Design of bolted and welded connections - Efficiency of joint - Concept of eccentric connections. Design of axially loaded tension members - Types of tension members - modes of failures - shear lag effect - IS code provisions and design.

Design of axially loaded compression members - section classifications - effective length - slenderness ratio – simple sections - built-up sections - design of lacings and battens - Column base – Slab base - Gusseted base - Column splices.

Flexural members – types of steel beams – Lateral stability of beams –effective length - design of laterally restrained and unrestrained beams – rolled sections - built-up beams/compound beams - Design of welded plate girder. Types of trusses - Economical spacing of roof trusses - Loads on roof trusses - Estimation of wind load on roof trusses as per IS:875 - Design of roof truss - Design of purlins – Design of gantry girder.

References

1. Subramanian.N, “Design of steel structures”, Oxford university press, 2011.
2. Edwin Gaylord and Charles Gaylord, “Design of Steel Structures”, McGraw Hill Education India Private Limited, 2010.
3. V.L. Shah and Veena Gore, “Limit State Design of steel structures IS: 800- 2007”, Structures Publications, 2012.
4. M.L. Gambhir, “Fundamentals of Structural Steel Design”, McGraw Hill Education, 2013.
5. Ramachandra and V. Gehlot, “Design of Steel Structures”, Scientific Publishers, 2015.

UCEC012	WATER RESOURCES ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives

- To acquire exposure to the developments of water resources for the purpose of controlling & utilizing water for a variety of purposes.
- To understand the concepts of irrigation, water supply & flood control.
- To gain an insight on local and global perceptions and approaches on participatory water resource management.
- To gain knowledge of design of reservoir, operation and sedimentation.

Course Content

Water Resources Survey - Water resources of India and Tamilnadu - Water Resources Planning - National water Policy - allocation of water resources, optimal cropping pattern, and conjunctive use of surface and subsurface water resources. Consumptive and non-consumptive water use - Estimation of water requirements for irrigation and drinking - Water characteristics and quality - Scope and aims of master plan - Concept of basin as a unit for development - Water budget and development plan.

Reservoir types - Storage zones of reservoir - Selection of site for a reservoir - Yield of a reservoir - mass curve and demand curve. Fixation of Storage capacity - Strategies for reservoir operation - Reservoir sedimentation. Reservoir losses and their control.

Need for irrigation - Advantages and ill effects - Surface & subsurface irrigation method - Duty, Delta, Base period - Crop seasons - Irrigation efficiencies - Crop water requirement - Factors affecting Consumptive use and estimation of consumptive use. Modernization technique - Participatory Irrigation Management – Water users associations.

References

1. P.N. Modi, Irrigation, “Water Resources and Water Power Engineering”, 9th Edition, Standard Book House, 2014.
2. B.C. Punmia and B.B. LalPande, “Irrigation and Water Power Engineering, 16th Edition, Laxmi Publications, 2014.
3. K. Subramanya, Engineering Hydrology, 4th Edition, Tata McGraw Hill Publishing, 2014.
4. Larry W. Mays , “Water Resources Engineering”, John Wiley & Sons, 2010.
5. David A. Chin, “Water-Resources Engineering”, 3rd Edition, Pearson, 2013.

UCEC013	ENVIRONMENTAL ENGINEERING-II	L	T	P	C
		2	0	1	3

Course Objectives

- To learn the basics of sewage composition and its characteristics
- To depict the information about various sewage treatment processes
- To provide the adequate information on various disposal standards for industrial effluents

Course Content

Characteristics and composition of sewage- sampling-analysis- population equivalent - drainage in buildings- Plumbing systems for drainage. Hydraulics of sewers - Self cleansing velocities - full flow / partial flow conditions - Sewer sections - sewer appurtenances - Design principles and procedures - materials for sewer - sewer joints - sewer laying - sewer cleaning and maintenance - sewage pumping - types of pumps - Laying, jointing and testing of sewers.

Principles and Design – Screens, Sedimentation, Flotation, Activated Sludge Process, Trickling Filter and Oxidation Pond – Lagooning - Sludge digestion – Sludge Disposal. Wastewater disposal standards - self-purification of rivers- Streeter Phelps equation - oxygen sag curve.

List of Experiments

- Dissolved oxygen
- Suspended, Volatile and Fixed Solids
- Biological Oxygen Demand
- Chemical Oxygen Demand

.

References

1. Mark J. Hammer, Mark J. Hammer Jr, "Water and Waste Water Technology", Prentice Hall of India, 7th edition, 2012.
2. Rangwala, Water supply & Sanitary Engineering, Charotar Publishing House, Gujarat, 2015.
3. Fair. G. M.., Geyer. J. C., "Water Supply and Waste Water disposal", John Wiley & Sons, 2010.
4. Punmia B.C, "Waste Water Engineering", Lakshmi Publications (P) Ltd., New Delhi, 2nd edition 2016

UCEC102	CONCRETE STRUCTURES – I	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the basic concepts of structural design.
- To gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage.
- To design the reinforced concrete members according to IS code.

Course Content

Introduction, methods of design of RC structures– Concept of elastic method, ultimate load method and limit state method – Advantages of Limit State method over other methods – Limit State philosophy as detailed in current IS Code. Design of rectangular beam section by elastic method.

Design of singly and doubly reinforced rectangular and flanged beams – use of design aids for flexure – Behavior of R.C. beams in shear and torsion – Shear and torsional reinforcement – Limit State design of R.C. members for combined bending, shear and torsion – Use of design aids. Design requirement for bond and anchorage as per IS code–Serviceability requirements.

Behavior of one way and two way slabs – design of one way simply supported, cantilever and continuous slabs – Design of two-way slabs for various edge conditions.

Types of columns -Short columns – Design of short columns for axial load, combined axial load with uniaxial and biaxial bending – Use of design aids - Design of Long columns (Principle only).Design of wall footing-Design of axially and eccentrically loaded rectangular pad and sloped footings – Design of combined rectangular footing for two columns only.

References

1. Gambir M.L., “Fundamentals of Reinforced Concrete Design”, Prentice Hall of India, 5th edition, 2011.
2. Punmia B.C., “Reinforced Concrete Structures – Vol 1”, Laxmi Publications, 2016
3. Syal I.C. & Goel A.K., “Reinforced Concrete Structures”, S.Chand Limited, 4th Edition 2008.
4. Ramamrutham S, “ Design of Reinforced Concrete Structures”, Dhanpat Rai Publishing Company, 2016.
5. Shah V.L. & Karve S.R., “ Handbook of Reinforced Concrete Design”, Structures Publications, 2010.

UCEC023	SURVEY CAMP	L	T	P	C
		0	0	0	1

(During IV Semester Summer Vacation) (2 Weeks)

Two weeks Survey Camp will be conducted during summer vacation in the following activities:

1. Triangulation
2. Trilateration and
3. Rectangulation

SEMESTER - VI

UCEC015	MATRIX METHODS OF STRUCTURAL ANALYSIS	L	T	P	C
		3	1	0	4

Course Objectives

- To know about advanced methods of analysis such as flexibility and stiffness matrix methods.
- To analyse indeterminate structures using matrix methods.
- To impart knowledge on computer programme using C language for analyzing framed structures.

Course Content

Introduction to flexibility method- element flexibility matrix- principle of contragradience and Force transformation matrix-member flexibility matrix- construction of structure flexibility matrix- matrix determination of the displacement vector- Determination of member forces- Analysis of continuous beams, indeterminate frames and trusses with maximum two degrees of static indeterminacy by flexibility method using force transformation matrix

Fundamentals of stiffness method- equivalent joint loads- Displacement transformation matrix- Member stiffness matrix-Total or system stiffness matrix-Analysis of continuous beams, indeterminate frames and trusses with maximum two degrees of static indeterminacy by stiffness method using Displacement Transformation Matrix.

Computation of Flexibility and stiffness matrices - C programming and flow charts.

References

1. Hibbeler, R.C., 'Structural Analysis', Pearson; 10th edition, 2017.
2. Wang C.K. , 'Indeterminate Structural Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2014.
3. Meek.J.L, 'Computer methods in Structural Analysis' CRC Press; 1 edition, 2017.
4. Singh.P.K, 'Matrix analysis of structures', Cengage; 1 edition,2013.
5. Bhavikatti,S.S, 'Structural Analysis, Vol.1 and 2', Vikas Publishing House Pvt. Ltd., New Delhi, 2013.

UCEC103	CONCRETE STRUCTURES – II	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the design concept of various structures and detailing of reinforcements.
- To understand the design of underground and elevated liquid retaining structures.
- To study the design of earth retaining structures.
- To know the effect of yield line.
- To study the design of bridges subjected to IRC loading.

Course Content

Earth Retaining structures - Retaining walls- types - cantilever and counterfort - design - drainage and other construction details. Liquid Retaining structure - Water tanks - types - square, rectangular, circular - Design of underground and elevated tanks - design of staging - spherical & conical roof for circular tanks - Design of circular slab and ring beam. Design of flat slabs-Design of staircases - Transportation structures - Bridges - Slab Bridge - Principles of design of box culverts and road bridges. Yield line theory- Assumptions, characteristics of yield line, determination of collapse load/plastic moment- Applications of virtual work method-square, rectangular and triangular slabs-design problems.

References

1. Winter and Nilson A H, "Design of Concrete Structures", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2005.
2. Vazirani, V.N., and Ratwani, “Concrete Structures”, Vol. IV, Khanna Publishers, New Delhi, 1995.
3. Dayaratnam, P., “Design of Reinforced Concrete Structures”, Oxford & IBH Publishers & Co., New Delhi, 2005.
4. Victor, D.J., “Essentials of Bridge Engineering”, Oxford & IBH Publishers Co., New Delhi, 1991.
5. Krishna Raju N, "Advanced Reinforced Concrete Design", CBS Publishers, New Delhi, 2010.

UCEC 104	DESIGN AND DRAWING OF CONCRETE AND STEEL	L	T	P	C
		0	0	2	2

Course Objectives

- To understand the design and detailing of reinforcements concept of various building elements.
- To understand the design and detailing of underground and elevated liquid retaining structures.
- To study the design and detailing of earth retaining structures.
- To study the design and detailing of industrial Structures.
- To study the design and detailing of bridges subjected to IRC loading.

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Course Content

Design of building elements (RC) - Standard method of detailing RC beams, slabs and columns – Special requirements of detailing with reference to erection process. Design and detailing of earth retaining structures - Design of Industrial Buildings - Steel roof trusses- Design of underground and Overhead water tanks (RC & Steel) - Design of box culvert and slab bridges

References

1. Ramamurtham and Narayanan, “Reinforced concrete structures”, Dhanpat Rai publishers, 2009.
2. Krishna Raju N, “Structural Design and Drawing (Reinforced Concrete and Steel)”, University press, Hyderabad, 2006.
3. Krishnamurthy, D., “Structural Design & Drawing” – Vol. II and III, CBS Publishers, 2010.
4. Duggal .S.K, “Design of steel structures”, Tata McGraw –Hill Publishing company Ltd, 2009.
5. IS456-2006 “Code of practice for Plain and reinforced concrete code of practice”.

UCEC105	PRESTRESSED CONCRETE STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the basic concepts of Prestressing.
- To gain the knowledge of prestressed concrete design for flexure, shear bond and anchorage zones.
- To analysis and design the composite and continuous beams.

Course Content

Principles of prestressing - Materials of prestressing - Systems of prestressing - Loss of prestress - Deflection of Prestressed Concrete members. Pre-tensioned and Post-tensioned beams - Design for flexure, bond and shear - IS code provisions - Ultimate flexural and shear strength of prestressed concrete sections - Design of end anchorage zones using IS code method.

Composite beams - Analysis and design. Partial prestressing - non-prestressed reinforcements. Analysis of Continuous beams - Cable layout - Linear transformation - Concordant cables.

Design of compression members and tension members. Circular prestressing - Water tanks - Pipes - Analysis and design - IS Codal provisions.

References

1. Guyon .V, “Limit State Design of Prestressed Concrete”, Vol.I& II Applied Science Publishers, London, 1992.
2. Rajagopalan.N, “Prestressed Concrete”, Narosa Publishing House, 2002.
3. Naaman A.E. “Prestressed Concrete Analysis & Design Fundamentals”, Mcgraw Hill Publication, 2014.
4. Muthu K.U. , Ibrahim Azmi , JanardhanaMaganti ,Vijayanand M. “Prestressed Concrete”, PHI Publications, 2016.
5. Krishna Raju N, “Prestressed Concrete”, Tata McGraw Hill Publishing Company, Delhi,2012.

SEMESTER - VII

UCEC019	ESTIMATION AND QUANTITY SURVEYING	L	T	P	C
		3	0	0	3

Course Objectives

- To provide the student with the ability to estimate the quantities of item of works involved in buildings, water supply and sanitary works, road works and irrigation works,
- To equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items.

Course Content

ESTIMATE OF BUILDINGS

Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.

ESTIMATE OF OTHER STRUCTURES

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – estimating of irrigation works – aqueduct, syphon, fall.

SPECIFICATION AND TENDERS

Data – Schedule of rates – Analysis of rates – Specifications – sources – Preparation of detailed and general specifications – Tenders – TTT Act – e-tender – Preparation of Tender Notice and Document – Contracts – Types of contracts – Drafting of contract documents – Arbitration and legal requirements.

VALUATION

Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortgage – Lease

REPORT PREPARATION

Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – Tube wells – Open wells.

References

1. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 2003
2. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand & Company Ltd., 2004
3. PWD Data Book.
4. Tamilnadu Transparencies in Tender Act, 1998
5. Arbitration and Conciliation Act, 1996

UCEC106	BASICS OF STRUCTURAL DYNAMICS AND EARTHQUAKE RESISTANT STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the concepts of dynamics.
- To analyse the behavior of structure to various dynamic loads.
- To understand the causes of damage due to seismic load.
- To design the structure to resist seismic load.

Course Content

Introduction to structural dynamics - Brief history of vibration and Earthquakes - Major earthquakes - Earthquakes zones-some basic definitions - Elements of Engineering Seismology – faults – seismic waves – earthquake intensity and magnitude – earthquake ground motion

Static and dynamic loading - Degrees of freedom – Idealization of structure as SDOF system – Formulation of equation of motion for various SDOF system – D' Alemberts Principles – Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic forces. Formulation of equation of motion for multidegree of freedom (MDOF) system – Evaluation of natural frequencies and modes – Eigen values and Eigen vectors – Response to free and forced vibration of undamped and damped MDOF systems – Modal superposition methods.

Causes of damage - Ductility - codal provision for detailing for earthquake resistance- IS 13920-1993 and IS1893:2002 Shear wall design and detailing.

Principles of Earthquake Resistant Design - Response spectrum theory. Time – Acceleration method Application of response spectrum theory to seismic design of structures.

References

1. Anil K Chopra, "Dynamics of Structures - Theory and Applications to Earthquake Engineering", Prentice Hall of India (P) New Delhi, 2004.
2. Paulay.T and Priestly. M.N.J, "Aseismic Design of Reinforced Concrete and Masonry Building", John Wiley and Sons, 1991.
3. PankajAgarwal& Manish Shrikhande, "Earthquake Resistant Design and Structures", Prentice Hall of India, New Delhi, 2006.
4. "Learning earthquake Design and Construction", Earthquake Tips 1 to 24, Authored by C.V.R. Murthy, IIT, Kanpur. eqtips@iitk.ac.in Web sites: www.nicee.org.
5. Humar.J.L, "Dynamics of Structures", Prentice Hall Inc., 1990.

PROFESSIONAL ELECTIVES I & II

UCEE001	HYDROLOGY	L	T	P	C
		3	0	0	3

Course Objectives

- To impart knowledge on hydrological cycle, spatial and temporal measurement and analysis of rainfall and their applications including flood routing and ground water hydrology.

Course Content

Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, and frequency relationship – Probable maximum precipitation. Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

Hydrograph - Factors affecting Hydrograph – Baseflow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations – Synthetic unit hydrograph.

Flood - Flood frequency studies – Recurrence interval – Gumbel's method – flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control.

Groundwater Hydrology - Types of aquifers – Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady flow analysis only.

References

1. Chow, V.T. and Maidment D.R., "Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2010.
2. VenTe Chow, David R.Maidment and Larry W.Mays,Applied Hydrology, The Tata Mcgraw Hill Edition, New Delhi, 2012.
3. Subramanya K, "Engineering Hydrology", Tata McGraw Hill Publishing Co., Ltd, 2013.
4. Patra K C, "Hydrology and Water Resources Engineering" Narosa Publishing House, New Delhi, 2012.
5. David Keith Todd. Groundwater Hydrology, John Wiley & Sons, Inc. 2011.
6. Santosh Kumar Garg, "Hydrology and Water Resources Engineering", Khanna Publications Pvt.Ltd. New Delhi, 2015.

UCEE002	REMOTE SENSING AND GIS	L	T	P	C
		3	0	0	3

Course Objectives

- To introduce the students about the basic concepts and principles of various components of remote sensing.
- To provide an exposure to GIS and its practical applications in civil engineering.

Course Content

Remote Sensing – Principle - Electro-magnetic energy, spectrum - EMR interaction with atmosphere – Atmospheric Windows and its Significance – EMR interaction with Earth Surface Materials – Spectral Signature and Spectral Signature curves for water, soil and Earth Surface. Satellites - Classification – Satellite Sensors – satellite and sensor parameters - Resolution – Types of Remote Sensing - Visual Interpretation of Satellite Images – Digital Image processing – Characteristics of different platforms: Landsat, SPOT, IRS series, IKONOS, QUICKBIRD – Radar, LIDAR, SAR, MODIS, AMSRE, Sonar remote sensing systems introduction of GPS- data receiving mode- DTM generation-View shed analysis.
GIS - History of Development - Components of GIS – Hardware, Software and Organizational Context – Data – Spatial and Non-Spatial – Data Input Sources— DBMS – Data Output - Data models - Raster and Vector data structures – Data compression – Raster vs. vector comparison. Analysis using Raster and Vector data – Operations – Overlaying - Buffering – Modelling in GIS - Digital Terrain Modelling, Analysis and application – Products of DEMs and their uses – Sources of errors in GIS and their elimination.
Applications of Remote Sensing and GIS – Advanced applications of GIS – Disaster management, Water resource, Land use – Land cover – Urban planning - Intelligent Transport Systems - Development of Resources Information Systems.

References

1. B.Bhatta, “Remote Sensing and GIS”, Oxford University 2011.
2. Martin Wegmannand Benjamin Leutner “Remote Sensing and GIS for Ecologists” Pelagic Publishing, 2016.
3. Peter M. Atkinson , Nicholas Tate, “Advances in Remote Sensing and GIS”, Wiley, 2012
4. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman, “Remote Sensing and Data Interpretation”, Wiley, 2015.
5. Anji Reddy M, “Remote Sensing and Geographical Information System”, Fourth Edition, B S Publications, 2012

UCEE003	SIMULATION MODELLING IN WATER RESOURCES	L	T	P	C
		3	0	0	3

Course Objectives

- To introduce the students about the basic concepts and principles of various modelling techniques in water resources.
- To provide an exposure to simulation model and its practical applications in civil engineering.

Course Content

Philosophy of modelling – Goals and Objectives – Basics of system analysis concept – scopes and steps in systems engineering.- Collection, evaluation and processing – project appraisal – public involvement, master Comprehensive and integrated planning of water resources project. Operation research - Problem Formulation-graphical solution- Simplex method – Sensitivity analysis - simple applications. Optimality criteria Stage coach problem – Bellman's optimality criteria Problem formulation and Solution - simple applications.

Optimization - Introduction-linear algebra – optimal conditions - optimization concepts- optimization methods-linear, quadratic, nonlinear and differential -economic aspects. Integer and parametric linear programming - Goal programming models with applications - Discrete differential dynamic programming and incremental dynamic programming - Linear decision rule models with application Stochastic dynamic programming models.

Simulation - Basic principles – Methodology and Philosophy – Model development – input and outputs – Deterministic simulation - simple applications.

References

1. Jain, Water resource Systems Planning and Management, ELSEVIER,2006
2. Taha H.A., Operation Research, McMillan Publication Co., New York, 2014.
3. Dong Shuning "Study on the Optimal Allocation of Water Resources Systems and the Comprehensive Utilization of Water Resources in Arid-Semiarid Multiple Mining Areas" Springer, 2016.
4. Vedula, S., and Majumdar, P.P. Water Resources Systems – Modelling Techniques and Analysis Tata McGraw Hill, New Delhi, Fifth reprint, 2012.
5. David W. Watkins, Water Resources Systems Analysis through Case Studies: Data and Models for Decision Making, UNESCO Publishing, ACSE Library (E-Book), 2013

UCEE004	INDUSTRIAL WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives

- To impart knowledge on sources and characteristics of various industrial wastes and strategies for its prevention and control

Course Content

Principles of Industrial waste treatment - sources of pollution physical chemical, organic and biological properties- effects of waters on streams, sewers and treatment plants.

Waste reduction Alternatives for raw materials, process changes, housekeeping - pretreatment of wastes - collection of waste segregation - equalization - reduction in volume and strength by other methods - theories of neutralization - equalization and proportioning.

A review of the methods adopted for the removal of suspended colloidal and dissolved organic solids removal of in organic dissolved solids - disposal of sludge solids - selection of site for the plant.

Manufacturing processes, flow sheets, characteristics and composition of wastes including waste reduction, treatment and disposal methods will be considered for some of the representative industries such as:

Food Industries: Sugar, Fermentation, Meat, dairy and Rice- milling.

Material Industries: Paper, Steel - Metal - plating and petroleum refineries.

Miscellaneous Industries: Textile, Tanning, Fertilizers and Atomic energy plants.

References

1. Rao M N and Dutta A K, “Wastewater Treatment”, Oxford – IBH Publication, 2007.
2. Eckenfelder W. W Jr, “Industrial Water Pollution Control”, McGraw Hill Book Company, New Delhi, 2008.
3. Nemerrow N L, “Industrial Waste Treatment”, Butterworth-Heinemann, 2007.
4. Bishop, P.L., “Pollution Prevention: Fundamental & Practice”, McGraw Hill, 2000.
5. Ahmad Ashfaq, “Industrial Waste Treatment Technology”, Katson Publications, 2014.
6. Sheryl McMillan, “Strategies for Waste Disposal and Pollution Control”, Syrawood Publishing House, 2016

UCEE005	AIR POLLUTION AND CONTROL ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives

- This subject covers the sources, characteristics and effects of air pollution and the methods of controlling the same. The student is expected to know about source inventory and control mechanism.

Course Content

Air Pollutants - Sources - Classification of Air Pollutants - Particulates and Gaseous Pollutants - Effects of Air Pollutants on Human Health, Vegetation and Property - Global Issues and Air Pollution - Global Warming - Ozone Layer Depletion - Ambient Air Quality and Emission Standards - Air Pollution Indices - Air Act.

Fundamentals of Meteorology - Wind Roses - Atmospheric Stability - Atmospheric Diffusion of Pollutants - Transport, Transformation and Deposition of Air Contaminants - Plume Behaviour - Atmospheric Diffusion Theories - Plume Rise - Gaussian Dispersion Models.

Control Principles - Principles and equipment description of control technologies - Particulates Control by Gravitational, Centrifugal, Filtration, Scrubbing, Electrostatic Precipitation - Absorption, Adsorption, Condensation, Incineration and Biofiltration for control of gaseous air pollutants - Biological Air Pollution Control Technologies - Bioscrubers, Biofilters.

Air Pollutants in Indoor Environments - Levels of Pollutants in Indoor and Outdoor Air - Indoor Air Pollution from Outdoor Sources - Measurement Methods - Control Technologies.

References

1. Noel De Nevers, “Air Pollution Control Engineering”, 2nd Edition, McGraw Hill International Edition, 2010.
2. Peavy H.S., Rowe D.R and George Tchobanoglous, “Environmental Engineering”, McGraw-Hill Company, New Delhi, 2013.
3. RaoM.N and H.V.N.Rao, “Air pollution”, Tata McGraw Hill Company, 2008.
4. Trivedy R.K. and Goel P.K., “An introduction to Air Pollution”, B.S. Publications, 2008.
5. Karl B. Schnelle, Jr., Russell F. Dunn, Mary Ellen Ternes, “Air Pollution Control Technology Handbook”, Second Edition, CRC Press, 2015

UCEE006	SOLID WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives

- To make the students conversant with different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

Course Content

Sources and types of municipal solid waste - Waste generation rates - factors affecting generation, composition, characteristics - methods of sampling, Effects of improper disposal of solid wastes - Public health and environmental effects. Elements of solid waste management - Municipal solid waste rules. Source reduction of waste - Reduction, Reuse and Recycling - Onsite storage methods- materials used for containers - Handling and segregation of wastes at source - Public health and economic aspects of open storage – waste segregation and storage – case studies under Indian conditions.

Methods of collection of municipal solid wastes - Collection vehicles - Manpower - Collection routes - Analysis of collection systems; Need for transfer and transport, Transfer stations - Selection of location, operation & maintenance. Objectives of waste processing - processing technologies - biological and chemical conversion technologies; Resource recovery from solid waste composting and biomethanation. Thermal processing options.

Land disposal of solid waste; Sanitary landfills - site selection, design and operation of sanitary landfills - Landfill liners - Management of leachate and landfill gas - landfill closure and environmental monitoring, Landfill bioreactor - Dumpsite Rehabilitation.

References

1. George Tchobanoglous and Frank Kreith, “Handbook of Solid waste Management”, McGraw Hill, New York, 2012
2. Bagchi., “Design of landfills and Integrated Solid Waste Management” ,John Wiley and sons, 2004.
3. Birhanu Aderaw Assaye, “Solid Waste Management”, LAP Lambert Academic Publishing, 2012.
4. Sunita Narain and Swati Singh Sambyal, “Solid Waste Management in Indian Cities” Centre for Science & Environment (CSE); 2016 edition (2016)
5. Thomas H Christensen, “Solid Waste Technology & Management”, Wiley, 2012.

PROFESSIONAL ELECTIVES
III & IV

UCEE007	INTELLIGENT TRANSPORT SYSTEM	L	T	P	C
		3	0	0	3

Course Objectives

- To give an overview of ITS, economic and financial analysis of ITS and security options in Transport systems.

Course Content

Definition, Overview and history of ITS, concepts, -types of Intelligent Transport System (ITS), ITS Strategic Planning and Evaluation. ITS Standards, software's, equipment's, National ITS Program Plan, International ITS Programs**,** ITS architecture.

Advanced Traffic Management Systems, Advanced Traveller Information Systems, Improving Highway Safety with ITS, Connected Vehicle Technology and Applications, Advanced Signal Systems, Advanced Rural Transportation Systems. Costing of ITS, ITS benefits assessment, economic and financial analysis of ITS, Congestion pricing, Revenue Generation Models.

ITS Mobile Applications, ITS Telecommunications Technologies, Interactive Voice Recognition (IVR) technologies, ITS security concepts.

References

1. Asier Perallos, Unai Hernandez-Jayo , Enrique Onievaand Ignacio Julio Garca Zuazola, "Intelligent Transport Systems: Technologies and Applications", Wiley publications, 2015.
2. Joseph S Sussman, "Perspectives on Intelligent Transportation Systems (ITS)" ,Springer, 2005.
3. Mashrur A. Chowdhury, and Adel Sadek, "Fundamentals of Intelligent Transportation Systems Planning" , Artech House, Inc., 2003.
4. Sumit Ghosh, Tony Lee, Tony S. Lee – "Intelligent Transportation Systems: New Principles and Architectures", CRC Press, 2000.
5. Mashrur A. Chowdhury, Adel WadidSadek – "Fundamentals of Intelligent Transportation Systems Planning", Artech House Publishers, 2003.

UCEE008	SOCIOLOGY AND ECONOMICS IN CIVIL ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives

- To impart knowledge on social and economic aspects related to construction sector.
- To understand the sustainable dimensions in infrastructural developments.

Course Content

Origin and Development of Sociology as an Independent Discipline - Nature and Scope - Relationship with Other Social Sciences - Uses of Sociology - Basic Concepts. Individual and Society - Theories about the Origin of Human Society - The Role of Heredity and Environment in the Development of Individual. Characteristics and Functions. Forms of Social Stratification: Estate, Caste and Class Systems. Status, Role and Power. Social Mobility. Social Control: Types of Social Control - Formal and Informal. Agencies of Social Control. Social Disorganization: Characteristics. Social Deviation.

Economics-Role of Civil Engineering in Industrial Development-Advances in Civil Engineering and engineering economics-Method of managerial economics- fundamental economic concepts – managerial economics with other subjects –objectives of the firm. Support matters of Economy as related top Engineering-Market demand and supply-Choice of technology- Quality control and Quality Production-Audit in economic law of returns governing production –Demand forecasting – Methods- Trend projections – Market equilibrium and price determination.

Construction of economics-Construction development in housing, Transport and other infrastructures-Economics of Ecology, environment, energy resources-Local material selection-Form and Functional designs-Construction workers-Urban problems-Poverty-Migration-Unemployment-pollution.

References

1. Mehta P.L., “Managerial Economics Analysis, Problems and cases”, Sultan Chand & Co. Ltd., 2001
2. Mote and Paul, “Managerial Economics”, Tata McGraw Hill, 2001
3. Anderesen, M.L. & Taylor, H.F., “Sociology The Essentials”, Wadsworth Thomson Learning, 2001.
4. Salvatore Dominick, “Managerial Economics in a Global Economy”. Thomson South Western, 4th Edition, 2001.
5. Samuelson. Paul A and Nordhaus W.D., “Economics”, Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.

UCEE009	HOUSING PLANNING AND MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives

- The objective of the course is to train the students to have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects. Emphasis is given on the principles of sustainable housing policies and programmes.

Course Content

INTRODUCTION TO HOUSING

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

HOUSING PROGRAMMES

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

PLANNING AND DESIGN OF HOUSING PROJECTS

Formulation of Housing Projects – Land Use and Soil suitability analysis -Building Byelaws and Rules and Development Control Regulations - Site Analysis, Layout Design, Design of Housing Units (Design Problems) – Housing Project Formulation.

HOUSING FINANCE AND PROJECT APPRAISAL

Evaluation of Housing Projects for sustainable principles – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy- Public Private Partnership Projects – Viability Gap Funding - Pricing of Housing Units (Problems).

References

1. Meera Mehta and Dinesh Mehta, "Metropolitan Housing Markets", Sage Publications Pvt. Ltd., New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, "Housing in India", Himalaya Publishing House, Bombay, 1997.
3. Donald Watson and Michael J.Crosbie, "Time Saver Standards for Architectural Design", 8th Edition, Tata McGraw Hill Edition, 2011
4. Walter Martin Hosack, "Land Development Calculations", McGraw Hill 2nd Edition, USA 2010
5. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2004.

UCEE010	EARTH AND ROCK FILL DAM	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the general features of earth and rock fill dam.
- To study the failures and damage protection of dams.
- To analyse the stability of slopes and identify the methods for its stability.
- To design the earth and rock fill dams.

Course Content

Classification of dams- Selection of Site-Basic design requirements-Preliminary section. Fundamentals of seepage flow, flow nets, seepage through dam section and foundation, seepage control filters, impervious core, and drainage. Control of seepage through foundations - types of foundations trench cutoff, upstream impervious blanket, horizontal drainage blanket, relief wells, drainage trenches, cut-off walls, downstream loading berm. Foundation treatment- treatment of pervious, impervious and rock foundations, core contact treatment, grouting, foundation excavation.

Stability Analysis - Types of Failure: Failure surfaces -Planar surfaces, Circular surfaces, Non-circular surfaces, Limit equilibrium methods, Total stress analysis versus effective Stress analysis, Use of Bishop's pore pressure parameters, Short term and Long term stability in slopes.

Construction of Earthen dams - construction equipment, procedures for pervious, semi-pervious, impervious and rock fill sections, construction supervision.

Rock fill dams: general characteristics, rock fill materials, foundation, construction, deformations, types of dams – Design of Rock fill dams.

References

1. Christian, K. “Earth & Rock fill Dams –Principles of Design and Construction”, CRC Press, 2011.
2. R. Mitchell, “Earth Structures Engineering”, Springer Science & Business Media, 2012
3. J. Michael Duncan, Stephen G. Wright, Thomas L. Brandon, “Soil Strength and Slope Stability”, John Wiley & Sons, 2014.
4. Sharma, Singh, “Slope Stability (Natural And Made Slope)”, Vei, First edition (2012).
5. Creager. W.P., Justin, J.D and Hinds. J “Engineering for Dams” John Wiley, London, 2007.

UCEE011	PAVEMENT ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives

- To provide knowledge on various IRC guidelines for designing rigid and flexible pavements.
- To identify the different methods of rehabilitation of highway pavements.
- To understand the different methods of maintenance and evaluation of pavement.

Course Content

Pavements- types of pavement- flexible and rigid- components of pavements and their functions- Provisions of IRC Guidelines for each component. Flexible pavement design- factors influencing design and performance of flexible pavement- Empirical method based on classification-Group Index method- Methods based on arbitrary strength-CBR method- Design procedure as per IRC guidelines Stresses in Flexible Pavements. Rigid Pavements - Design – General design considerations – Westerguard's equation Evaluation of wheel load stresses –Temperature stresses – Design of joints – IRC design guidelines – Airfield pavements – design principles.

Pavement Evaluation- causes of distress in rigid and–Evaluation based flexible pavements on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection.

Stabilisation with special reference book to highway pavements – Choice of stabilizers –Testing and field control Stabilization for rural roads in India – use of Geosynthetics in roads.

References

1. Kadyali.L.R., "Principles and practice of Highway Engineering", Khanna Technical Publications, Delhi, 2013.
2. Rajib B. Mallick & Tahar El-Korchi, "Pavement Engineering: Principles and Practice", Third Edition, CRC Press, 2017.
3. A. T. Papagiannakis & E. A. Masad, "Pavement Design and Materials", Wiley Publication, 2007.
4. Yoder.R.J. and Witchak M.W., "Principles of Pavement Design", John Wiley, 2000.
5. Nai C.Yang, "Design of functional pavements", McGraw -Hill, 2004.

UCEE012	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the various dewatering, densification techniques, earth reinforcement, grouting and stabilization methods.
- To understand the concepts of reinforced earth and applications of geotextiles in various civil engineering projects.

Course Content

Role of ground improvement in foundation engineering – methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.Dewatering Techniques - Well points – Vacuum and electro osmotic methods – Seepage analysis for two dimensional flows for fully and partially penetrated slots in homogeneous deposits - Simple cases.

Insitu densification of cohesion-less soils and consolidation of cohesive soils: Dynamic compaction vibro flotation, Sand compaction piles and deep compaction. Consolidation: Preloading with sand drains, and fabric drains, Stone columns and Lime piles-installation techniques – simple design - relative merits of above methods and their limitations. Earth Reinforcement - Concept– Types of reinforcement material – Reinforced earth wall – Mechanism – simple design - applications of reinforced earth.

Grouting techniques - Applications – Functions – Characteristics of grouts – Types of grout – Suspension and solution grouts –Basic requirements of grout – Displacement grouting – injection methods - Compaction grouting - Permeation grouting – Grouting equipment – Grout monitoring – stabilization with cement, lime and chemicals – stabilization of expansive soil.

References

1. Purushothama Raj. P, "Ground Improvement Techniques", Firewall Media, 2005.
2. Koerner, R.M. “Construction and Geotechnical Methods in Foundation Engineering”, McGraw Hill, 1994.
3. Moseley M.P, "Ground Improvement Blockie Academic and Professional", Chapman and Hall, Glassgow, 1993.
4. Jewell, R.A., “Soil Reinforcement with Geotextiles”, CIRIA special publication, London, 1996
5. Winterkorn, H.F. and Fang, H.Y. “Foundation Engineering Hand Book”. Van Nostrand Reinhold, 2013.

PROFESSIONAL ELECTIVES
V & VI

UCEE013	MAINTENANCE, REPAIRS AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives

- To gain knowledge on repair, rehabilitation, facets and the importance of maintenance including various aspects of inspection.
- To recognize various distresses in structures and its effects due to climate, temperature, chemicals and corrosion.
- To identify suitable materials as well as techniques for repairing and rehabilitation of damaged structures.
- To evaluate the strength of existing structures by Non-destructive testing methods considering the effect of distresses in structures.

Course Content

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration. Performance of construction materials and components in services for strength, permeability, thermal properties and cracking effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, Effects of cover thickness.

Corrosion damage of reinforced concrete, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection, rust eliminators. Causes of deterioration of concrete, steel, masonry and timber structures.

Special concrete and mortar, concrete chemicals, expansive cement polymer concrete, fiber reinforced concrete. Methods of repairing concrete, steel, masonry and timber structures. Gunite and shotcrete, epoxy injection.

Strengthening of existing structures - repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering, wear, fire, leakage, use of non-destructive testing techniques for evaluation, load testing of structure - Demolition of structures using engineered and non-engineered techniques - case studies.

References

1. Varghese P C, "Maintenance, Repair & Rehabilitation and Minor Works of Buildings", PHI Learning Pvt. Ltd, New Delhi, 2014.
2. Neville A M, "Properties of Concrete", Pearson Education, 2012.
3. Dodge Woodson R, "Concrete Structures: Protection, Repair and Rehabilitation", Butterworth-Heinemann Publishers, 2009.
4. Ravishankar K, Krishnamoorthy T S, "Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.
5. "Handbook on Repair and Rehabilitation of RCC Buildings", Central Public Works Department, 2002.

UCEE014	PREFABRICATED STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives

- To impart knowledge to students on modular construction, industrialized construction and design of prefabricated elements and construction methods.

Course Content

Need for prefabrication – Principles – Materials – Modular coordination – Standardization – Systems – Production – Transportation – Erection.

Prefabricated components - Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls.

Design Principles - Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

Joints for different structural connections – Dimensions and detailing – Design of expansion joints - Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

References

1. CBRI, Building materials and components, India, 1990
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., "Knowledge based process planning for construction and manufacturing", Academic Press Inc., 1994.
3. Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 1976.
4. "Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009

UCEE015	CONSTRUCTION PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives

- To study the effect of management for project organization, design of construction process, labour, material and equipment utilization, and cost estimation.

Course Content

Introduction - Project Life Cycle - Types of Construction - Selection of Professional Services - Construction Contractors - Financing of Constructed Facilities - Legal and Regulatory Requirements - Changing Environment of the Construction Industry - Role of Project Managers.

Project Management – modern trends - Strategic Planning - Effects of Project Risks on Organization - Organization of Project Participants -Traditional Designer-Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team.

Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Construction Site Environment.

Historical Perspective - Labour Productivity - Factors Affecting Job-Site Productivity - Labour Relations in Construction - Problems in Collective Bargaining - Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management. - Construction Equipment - Choice of Equipment and Standard Production Rates - Construction Processes Queues and Resource Bottlenecks.

Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs.

References

1. Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2. Choudhury S , "Project Management", McGraw-Hill Publishing Company, New Delhi, 1988.
3. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders", Prentice Hall, Pittsburgh, 2000.
4. Frederick E. Gould, "Construction Project Management", Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000.
5. George J.Ritz , "Total Construction Project Management" - McGraw-Hill Inc, 1994.

UCEE016	ADVANCED CONSTRUCTION TECHNIQUES	L	T	P	C
		3	0	0	3

Course Objectives

- To study the various construction techniques for Power stations, Bridges, Metro Rail Projects and High Rise Buildings.

Course Content

Construction of power generating structures – Atomic Power stations, Thermal power stations. Windmills, Transmission towers, Chimneys (single and multi-flue), cooling towers - Natural draft cooling towers (NDCT) & Induced draft cooling tower (IDCT), Ash handling system, Containment Structure, Electro Static Precipitator (ESP), Case study of Kaiga atomic power station, Madras atomic power station.

Bridges, Steel Bridges, Arch Bridges, Cantilever Bridges Segmental construction & Box Girders. Construction of special type of bridges such as cable stayed bridge, suspension and Pre-stressed Bridge, construction of foundation and Super structure. Construction of Metro Railway - Underground and over ground structures, different methods and techniques of construction.

High rise buildings – Construction methods and techniques using in-situ concrete, Precast Concrete & Structural Steel, finished concrete, tunnel form, fire Fighting, Safety. Innovative methods of construction – Slip form technology, Jump from technology, Dry wall technology, Plastering Machines.

References

1. Roy Chudley and Roger Greeno, “Construction Technology”, Prentice Hall, 2005.
2. Peurifoy, “Construction Planning, Equipment and methods “ Tata McGraw Hill Publication, 2012
3. NICMAR Publications on Construction Engineering.

UCEE101	FINITE ELEMENT ANALYSIS	L	T	P	C
		3	0	0	3

Course Objectives

- To learn basic principles of finite element analysis methods.
- To learn the theory and characteristics of finite elements that represent engineering structures.
- To learn and apply finite element solutions to structural problem to develop the knowledge and skills needed to effectively evaluate finite element analyses performed by others.

Course Content

Introduction to Finite Element Method – Background and general description of the method – summary of the analysis procedure.

Theory of Finite element method – Concept of element – various elements shapes – displacement models – shape functions – iso parametric elements – formulation of element stiffness and loads – condensation of internal degrees of freedom.

Overall problem – Assemblage of elements construction of stiffness matrix and loads – boundary conditions and solution of overall problem – Application to continuous beam – spring assemblage – stability of columns – curved beams and vibration problems - torsions of shafts.

Generalization of FEM – Six step finite element procedure in general terms – application to structural engineering problems

References

1. Tirupathi R. Chandrupatla and Ashok D. Belugundu, “Introduction to Finite Elements in Engineering”, Third Edition, Prentice Hall India Pvt Ltd, 2011.
2. S.S.Rao, “The Finite Element Method in Engineering”, Buttersworth-Heinemann publishing, 2010.
3. Krishnamoorthy C.S., “Finite Element Analysis-Theory and Programming”, Second Edition, Tata McGraw Hill Publishing Co., 2011.
4. Zienkeiwicz. O.C ‘The Finite Element Method’, Tata McGraw Hill Co. Ltd., New Delhi, 2013.
5. S.S. Bhavikatti, ‘Finite Element Analysis’ New Age International Publishers, New Delhi, 2014.

UCEE102	INDUSTRIAL STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives

- To gain understanding about various materials and structural components used for industrial buildings.
- To interpret the applications of steel sections in the construction of industrial structures.
- To illustrate the principle of prefabrication and its application.
- To analyse and design the various industrial structures such as stacks bunkers and silos.

Course Content

Design of industrial building - roofing, cladding and wall material - structural components and framing - types of roof trusses - components - wind load estimation as per IS875 part 3 - design of purlins and wall girts using Channel and Angle sections - truss members - joints - cold formed steel purlin. Analysis and design of steel stacks - functional and structural requirements – self -supporting and guyed stacks - base plate and anchor bolt. Design industrial concrete structures - Silos and bunkers – Chimney. Principles of prefabrication – Prestressed precast roof trusses - Construction of roof and floor slabs - Wall panels.

References

1. Edwin. H. Gaylord, Charles. N. Gaylord, James. E. Stall Meyer, “Structural Engineering Hand Book”, McGraw Hill book Co., 1990.
2. Mohamed A. El-Reedy, “Construction Management and Design of Industrial Concrete and Steel Structures”, CRC Press, 2010.
3. Ramamrutham.S. “Design of Reinforced Concrete Structures”, DhanpatRai Publishing Company, 2007.
4. Robert Engle irk , “Steel Structures, Controlling Behaviour through Design”, John Wiley & Sons, Inc., 2003.
5. Bhavikatti.S.S. “Design of Steel Structures”, J.K.International Publishing House Pvt.Ltd. 2009.

UCEE103	COMPUTER AIDED DESIGN OF STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the various aspects of computer applications into architectural design and construction.
- To understand the principles of computer aided design and computer graphics.
- To learn various structural engineering packages for analysis and design of structures by using STADD Pro, ETABS.
- To introduce the principles of Neural Network system and its application

Course Content

Introduction to Computer Aided Design: Reasons for implementing Computer Aided Design - Applications of computers to design - Benefits of computer aided design. Computer method of structural analysis – Simulation and Analysis of steel sections I, channel and Angle – RCC and Composite members - Nonlinear Analysis through software packages. Design and Optimization: Optimization techniques - Principles of Design of Steel and RCC structures - Applications to simple design problems - Detailing of reinforcement – Detailed Drawing.

Structural Engineering Packages: Introduction of various structural engineering packages -analysis and design of structures by using STADD Pro, ETABS. Introduction – Heuristic Research – Knowledge based Expert Systems – Architecture and Applications – Rules and Decision tables – Inference Mechanisms – Simple Applications – Genetic Algorithm and Applications – Principles of Neural Network – Expert system shells.

References

1. V.L. Shah “Computer Aided Design in Reinforced Concrete” Structural Publishers, 2014.
2. M. Groover and E. Zimmers. “CAD/CAM: Computer-Aided Design and Manufacturing", Pearson Education, 2014.
3. Harrison H.B., “Structural Analysis and Design Vol.I and II”, Pergamon Press, 2011
4. Hinton E.and Owen D.R.J., “Finite Element Programming”, Academic Press 2012.
5. Rao. S.S., "Optimisation Theory and Applications ", Wiley Eastern Limited, New Delhi, 2014.
6. Richard Forsyth (Ed.), “Expert System Principles and Case Studies”, Chapman and Hall, 2013.

UCEE104	DESIGN OF ENERGY EFFICIENT BUILDING	L	T	P	C
		3	0	0	3

Course Objectives

- To learn the green buildings concepts applicable to modern buildings
- To Acquaint students with the principle theories, materials, construction techniques and to create energy efficient buildings
- To understanding of the concept of reduction in energy consumption through low energy building design.
- It will highlight strategies to integrate day lighting and low energy heating/cooling in buildings.

Course Content

Introduction to Built Environment and Energy Efficiency – Conventional versus Energy Efficient buildings – Energy – IAQ requirement analysis – Micro-climates – various methods – Modification of microclimate through landscape elements for energy conservation. Future building design aspects – Energy efficient Landscape design - The Energy Conserving Building Envelope – Foundations & Floors, Walls, Ceilings and Roofs. Building materials, Envelope heat loss and heat gain and its evaluation, paints, Insulation. Natural Ventilation - Ventilation and its significance. HVAC Systems and Control. Passive cooling and heating - Application of wind, water and earth for cooling, evaporative cooling, radiant cooling – Hybrid Methods – Energy Conservation measures, Thermal Storage integration in buildings Surface co-efficient: air cavity, internal and external surfaces, overall thermal transmittance, wall and windows; Heat transfer due to ventilation/infiltration, internal heat transfer; Solar temperature; Decrement factor; Phase lag. Design of day lighting Computer packages for carrying out thermal design of buildings and predicting performance. Passive concepts appropriate for the various climatic zones in India.

References

1. Krieder, J and Rabi, A., **"**Heating and Cooling of buildings: Design for Efficiency**"**, McGraw Hill, 1994.
2. Ursala Eicker, "Solar Technologies for buildings", Wiley publications, 2003.
3. Bureau of Indian Standards, I.S. 11907 –1986 Recommendations for calculation of Solar Radiation Buildings, 1986.
4. Givoni,B., "Man, Climate and Architecture", Elsevier, Amsterdam, 1986.
5. Smith, R. J., Phillips, G.M. and Sweeney, M. "Environmental Science", Longman Scientific and Technical, Essex, 1982.

GENERIC ELECTIVES OFFERED BY COMPUTER SCIENCE AND ENGINEERING

UCSG001	FUNDAMENTALS OF INFORMATION SECURITY	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To analyse the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

Course Content

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

Security Investigation

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

Security Analysis

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

Logical Design

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture

Physical Design

Security Technology, IDS, Scanning and Analysis Tools, Cryptography – Protocols for secure communications, Physical Security, Security and Personnel.

References

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003.
2. Micki Krause, Harold F. Tipton, " Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
3. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
4. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.
5. Mark Stamp, "Information Security: Principles and Practice", Wiley-Blackwell, 2nd edition, 2011.

UCSG002	INTRODUCTION TO COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Course Objectives

- Understand the division of network functionalities into layers
- Be familiar with the components required to build different types of networks
- Be exposed to the required functionality at each layer
- Learn the flow control and congestion control algorithms

Course Content

Fundamentals & Link Layer
Building a network – Requirements - Layering and protocols - Internet Architecture – Network software – Performance ; Link layer Services - Framing - Error Detection - Flow control

Media Access & Internetworking
Media access control - Ethernet (802.3) - Wireless LANs – 802.11 – Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP)

Routing
Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM)

Transport Layer
Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission – TCP Congestion control - Congestion avoidance (DECbit, RED)

Application Layer
Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – Web Services – DNS - SNMP

References

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.
2. James F. Kurose, Keith W. Ross, “Computer Networking - A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.
5. Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw – Hill, 2011.

UCSG003	INTRODUCTION TO SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives

- To be successful professionals in the field with solid fundamental knowledge of software engineering
- To utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
- To apply the foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

Course Content

Requirements Analysis and Specification

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets.

Software Design

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components

Testing and Maintenance

Software testing fundamentals-Internal and external views of Testing–Types of testing - System testing and debugging –Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Re-engineering-BPR model

References

1. Roger S Pressman, “Software Engineering – A Practitioner’s approach”, Seventh edition, McGraw-Hill International edition, 2010.
2. Ian Somerville, “Software Engineering”, 9th edition, Pearson Education Asia, 2011.
3. Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI Learning Private Limited, 2009.
4. Pankaj Jalote, “Software Engineering”, A Precise Approach, Wiley India, 2010.
5. James F Peters, Witold Pedrycz, “Software Engineering an Engineering Approach”, John Wiley, Dec 1999.

UCSG004	PYTHON PROGRAMMING FOR ENGINEERS	L	T	P	C
		3	0	0	3

Course Objectives

- To know the basics of algorithmic problem solving, read and write simple Python programs.
- To develop Python programs with Python data structures –- lists, tuples, dictionaries.

Course Content

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments.

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays.

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension.

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages.

References

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2", Network Theory Ltd., 2011.
3. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2013.
4. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
5. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

UCSG005	SOFT COMPUTING AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

Course Objectives

- Introduce a relatively new computing paradigm for creating intelligent machines useful for solving complex real world problems.
- Insight into the tools that make up the soft computing technique: fuzzy logic, artificial neural networks and hybrid systems Techniques.

Course Content

Introduction to Soft Computing, Introduction to Fuzzy logic, Fuzzy membership functions, Operations on Fuzzy sets Fuzzy relations, Fuzzy propositions, Fuzzy implications Fuzzy inferences Defuzzyfication Techniques-I, Defuzzyfication Techniques-II, Fuzzy logic controller-I, Fuzzy logic controller-II Solving optimization problems, Concept of GA, GA Operators: Encoding, GA Operators: Selection-I

GA Operators: Selection-II, GA Operators: Crossover-I, GA Operators: Crossover-II, GA Operators: Mutation Introduction to EC-I, Introduction to EC-II. MOEA Approaches: Non - Pareto, MOEA Approaches: Pareto – I MOEA Approaches: Pareto - II, Introduction to ANN, ANN Architecture and ANN Training-I, ANN Training-II, ANN Training-III, Applications of ANN.

References

1. S.Rajasekaran and G.A.Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications”, Prentice-Hall of India Pvt. Ltd., 2006.
2. George J. Klir, Ute St. Clair, Bo Yuan, “Fuzzy Set Theory: Foundations and Applications” Prentice Hall, 1997.
3. David E. Goldberg, “Genetic Algorithm in Search Optimization and Machine Learning” Pearson Education India, 2013.
4. James A. Freeman, David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
5. Simon Haykin, “Neural Networks Comprehensive Foundation” Second Edition, Pearson Education, 2005.

GENERIC ELECTIVES OFFERED BY ELECTRICAL AND ELECTRONICS ENGINEERING

UEEG001	ENERGY MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives

- To train the students for energy auditing and managing the energy demand by analyzing the energy issues and concern.

Course Content

Introduction to Energy Management, Buildings assessment, Electrical Systems-Supply Demand Side-Economic operation.

Electric motors-Energy efficient controls and Load Analysis, Efficient Control strategies-Optimal operation, Transformer Loading- Efficiency analysis, Feeder and cable loss evaluation, Optimal Load scheduling, Energy conservation in Lighting Schemes, Power quality issues. Cogeneration-Types and Schemes, Electric loads of Air conditioning & Refrigeration, case studies.

Electricity tariff types; Computer Controls- software-EMS- Energy conservation opportunities in electrical power supply sector.

References

1. Leon K. Kirchmayer, “Economic Operation of power system”, Wiley India Pvt Ltd, July 2010.
2. Jean-Claude SabonnadiAre, “Low emission power generation technologies and energy management”, John Wiley & Sons, August 2010
3. Rik DeGunther, “Alternative energy for dummies”, John Wiley & Sons, May 2010.
4. Donald R Wulfinghoff, “Energy Efficiency Manual”, Energy Institute Press, USA, 1999.
5. Tripathy S C, “Electrical Energy Utilization and Conservation”, Tata McGraw-Hill, New Delhi, 1991.

UEEG002	MEDICAL INSTRUMENTATION	L	T	P	C
		3	0	0	3

Course Objectives

- To impart knowledge on operation of instruments used for various physiological measurements and the blood flow measurement techniques.

Course Content

Components of Medical Instrumentation; System Origin of Bio potential; Bio amplifiers: Isolation Amplifier, Differential amplifier, Chopper Amplifier, Instrumentation Amplifier, Bioelectric signals:ECG, EMG,EEG, EOG & ERG and their characteristics; Electrodes for ECG, EEG and EMG; Einthoven triangle; Standard 12-lead configurations; ECG Machine; EMG machine; 10-20 electrodes placement system for EEG; Heart sound and characteristics; PCG.

Measurement of Blood pressure: Direct Methods and Indirect Methods; Temperature; Respiration rate; Heart rate measurement; Oximetry: Pulse-oximeter; Computerized patient monitoring system; Biotelemetry: Basics components, and its different types; Cardiac output Measuring techniques: Dye Dilution method, Thermo dilution Method.

Blood flow measuring techniques: Electromagnetic Type; Ultrasound Blood Flow meter; Cardiac Arrhythmias; Plethysmography; Cardiac Pacemakers; Defibrillator: AC and DC-types; Heart- Lung Machine; Optical method: Colorimeter, Spectro photometer, Flame photometer; Safety in medical field: Electrical hazard, Micro and Macro shock; Patient safety procedures.

References

1. Joseph J.Carr and John M. Brown, “Introduction to Biomedical Equipment Technology”, John Wileyand sons, New York, 4th Edition, 2012.
2. Khandpur.R.S, “Hand book of Bio-Medical Instrumentation”, Tate McGraw –Hill 2015.
3. Duane Knudson, “Fundamentals of Biomechanics”, Springer, 2013.
4. Robert B. Northrop, “Introduction to Instrumentation and Measurements”, Taylor and Francis group, New York, 3rd Edition, 2014.
5. John G. Webster, “Medical Instrumentation Application and Design”, John Wiley and sons, New York, 2010.

UEEG003	PLC PROGRAMMING	L	T	P	C
		3	0	0	3

Course Objectives

- To understand Programmable Logic Controller and its functions.
- To impart knowledge in various PLC programming methods.

Course Content

Programmable Logic controller-Brief history, difference between PC & PLC, architecture, benefits, PLC cycle Application.

Overview of PLC programming methods, ladder diagram, various examples of PLC application, a basic relay type instruction, timer and counter instructions, logical and arithmetic instructions, data handling instructions. Comparison and manipulation instructions, PID instructions, PTO / PWM generation.

Applications of PLC- Case studies of Machine automation, Process automation, Selection parameters for PLC. Introduction to Programmable Automation Controller.

References

1. John W Webb, Ronald A Reis, “Programmable logic controllers: Principles and Applications”, Prentice Hall India, 2003.
2. Frank D Petruzella, “Programmable Logic Controllers ", McGraw Hill Inc, 2005.
3. Kelvin T Erikson, “Programmable Logic Controllers”, Dogwood Valley Press, 2005.
4. Garry Duning, “Introduction to Programmable Logic Controller”, Cengage Learning, 3rd Edition, 2006.
5. W. Bolten, “Programmable Logic Controller”, Elsevier Newnes Publication, 5th Edition, 2009.

UEEG004	RENEWABLE ENERGY SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives

- To provide knowledge about various renewable energy technologies.
- To gain knowledge about application of various renewable energy technologies.

Course Content

Primary energy sources, renewable vs. non-renewable primary energy sources, renewable energy resources in India, Current usage of renewable energy sources in India, future potential of renewable energy in power production and development of renewable energy technologies.

Solar and wind Power Generation, Energy from Biomass Bio gas generation, types of biogas plants, Application of biomass and biogas plants and their economics.

Energy conversion from Hydrogen and Fuel cells, Geo thermal energy Resources, types of wells, methods of harnessing the energy, potential in India. OTEC, Principles utilization, setting of OTEC plants. Tidal and wave energy: Potential and conversion techniques, mini hydal power plants and their economics.

References

1. John Twidell and Tony Weir, “Renewable Energy Resources” Tyalor and Francis Publications, 2005.
2. Clark W Gellings, “The Smart Grid, Enabling Energy Efficiency and Demand Side Response”, CRC Press, 2009.
3. Krzysztof Iniewski, “Smart Grid & Infrastructure networking”, TATA Mc Graw Hill, 2012 edition.
4. Bin Wu, Yongqiang Lang, Navid Zargari, Power Conversion and Control of Wind Energy Systems. WILEY 2011.
5. J. W. Tester, E. M. Drake, M. W. Golay, M. J. Driscoll, and W. A. Peters, Sustainable Energy: Choosing Among Options. The MIT Press, ISBN 978-0-262-20153-7.

UEEG005	VIRTUAL INSTRUMENTATION & DATA ACQUISITION	L	T	P	C
		3	0	0	3

Course Objectives

- To impart the knowledge about software and the programming structure of LabVIEW.
- To introduce various techniques of interfacing of external instruments of PC.

Course Content

Virtual Instrumentation: Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, and comparison with conventional programming; VI programming techniques: VIs and sub-VIs, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers.

Data acquisition basics: Introduction to data acquisition, Sampling fundamentals andInput/Output techniques: ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements, VI Chassis requirements;Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB; Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, PXI system controllers, Ethernet control of PXI.

Analysis tools & Applications of VI: Fourier transforms, Power spectrum, Correlation methods, Windowing and flittering; Industrial applications: Instrument Control, Simulation of systems using VI, Development of Control system, Image acquisition and processing, Motion control.

References

1. Jane W. S. Liu," Real-time Systems", Pearson Education, 2001.
2. Jovitha Jerome, "Virtual Instrumentation using LabVIEW", Prentice Hall of India, New Delhi, 2011.
3. Gary Johnson, "LabVIEW Graphical Programming", McGraw Hill, 1997.
4. Kevin James, "PC Interfacing and Data Acquisition: Techniques for Measurement", Instrumentation and Control, Newnes, 2000.
5. Gupta S and Gupta J P, "PC Interfacing for data acquisition and Process control", Instrument Society of America.

GENERIC ELECTIVES OFFERED BY ELECTRONICS AND COMMUNICATION ENGINEERING

UECG001	ELECTRONIC MEASUREMENTS	L	T	P	C
		3	0	0	3

Course Objectives

- To impart knowledge on the functional elements of instrumentation.
- To learn the fundamentals of electrical and electronic instruments.
- To understand the operation of transducers, data acquisition systems, storage and display devices.

Course Content

Electronics Instruments

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement — Standards and calibration – Principle and types of analog and digital voltmeters, ammeters, multimeters – Single and three phase wattmeters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss.

Measuring Instruments

D.C & A.C potentiometers, D.C & A.C bridges, transformer ratio bridges, self-balancing bridges. Interference & screening – Multiple earth and earth loops - Electrostatic and electromagnetic interference – Grounding techniques.

Storage and display Devices

Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & dot matrix display – Data Loggers.

Transducers and Data Acquisition Systems

Classification of transducers – Selection of transducers – Resistive, capacitive & inductive transducers – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition system – A/D, D/A converters – Smart sensors.

References

1. A.K. Sawhney, “A Course in Electrical & Electronic Measurements & Instrumentation”, Dhanpat Rai and Co, 2004.
2. J. B. Gupta, “A Course in Electronic and Electrical Measurements”, S. K. Kataria & Sons, Delhi, 2003.
3. J Doebelin E.O. and Manik D.N., “Measurement Systems – Applications and Design”, Special Indian Edition, Tata McGraw Hill Education Pvt. Ltd., 2007.
4. H.S. Kalsi, “Electronic Instrumentation”, Tata McGraw Hill, II Edition 2004.
5. D.V.S. Moorthy, “Transducers and Instrumentation”, Prentice Hall of India Pvt Ltd, 2007.

UECG002	INTRODUCTION TO EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the architecture and programming concepts of embedded systems.
- To impart the knowledge on embedded computing platform design and analysis.
- To learn the basic concepts of real time operating systems and embedded system applications.

Course Content

Architecture of Embedded Systems

Categories of Embedded Systems – Specifications of Embedded systems – Recent trends in Embedded Systems – Detailed Hardware and Software Design – ARM Processor – CPU: programming input and output - supervisor mode, exceptions and traps – Co-processors – Memory system mechanisms – CPU performance – CPU power consumption.

Embedded Computing Platform Design

The CPU Bus-Memory devices and systems – Designing with computing platforms – Host and target machines – consumer electronics architecture – platform-level performance analysis - Components for embedded programs – Models of programs – Assembly, linking and loading – compilation techniques – Program level performance analysis

Processes and Operating Systems

Introduction – Multiple tasks and multiple processes – Multi rate systems – Preemptive real-time operating systems – Priority based scheduling – Inter process communication mechanisms –Semaphores and Shared Data – Message Queues – Mailboxes and Pipes – Interrupt Routines in RTOS Environment – Evaluating operating system performance – power optimization strategies for processes.

Hardware/Software Integration & Programming

Cross-Compilers – Cross-Assemblers – Linker/Locator – Debugger – Emulator – Simulators – Introduction to Integrated Development Environment (IDE) – Getting Embedded Software into Target System: In-Circuit Emulators –Serial Port Programming and Interrupts Programming.

Embedded System Applications

Applications of Embedded systems – Case study of Embedded systems like automatic chocolate vending machine, Adaptive Cruise Control Systems in a Car, Digital camera, Smart card and ATM.

References

1. Marilyn Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Third Edition, Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.
2. Jonathan W. Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, Third Edition Cengage Learning, 2012.
3. Raj Kamal, “Embedded Systems Architecture Programming and Design”, Pearson, 2011.
4. K.V.K.K.Prasad “Embedded /Real-Time Systems: Concepts, Design and Programming” Dream tech, Wiley 2012.
5. Daniel 5.W Lewis, “Fundamentals of Embedded Software” Pearson Education, 2013.

UECG003	MICROCONTROLLERS AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the architecture and programming of 8051 and PIC microcontrollers.
- To familiarize with the concept of interfacing the microcontrollers for various applications.

Course Content

8051 Microcontroller

Architecture of 8051 – Register set - I/O Pins, Ports and Circuits - Instruction set - Addressing modes - Assembly language programs for arithmetic and Logical operations.

Interfacing 8051 Microcontroller

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - Stepper Motor Interfacing – Application of 8051 in power optimization- Power and real-world constraints.

PIC Microcontroller

CPU Architecture – Register – I/O pins, Ports -Instruction set – addressing modes - Interrupts

Interfacing PIC Microcontroller

PIC: Timers- I2C Interfacing –UART- A/D Converter –Pulse Width Modulation

References

1. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson Education, 2011
2. Subrata Ghoshal, “8051 Microcontrollers: Internals, Instructions, Programming &Interfacing”, Second Edition, Pearson education, 2014.
3. John. B. Peatman, “Design with PIC Microcontroller”, Prentice Hall, 2011.
4. Gene .H.Miller, “Micro Computer Engineering”, Pearson Education, 2013.
5. Subrata Ghoshal, “8051 Microcontrollers: Internals, Instructions, Programming &Interfacing”, Second Edition, Pearson education, 2014.

UECG004	NANO ELECTRONICS AND SENSORS	L	T	P	C
		3	0	0	3

Course Objectives

- To learn the basics of Nano electronics.
- To learn characteristics and operation of the basic components of Nano electronic systems.
- To familiarize with characteristics of Sensors, Actuators and Memory Devices.

Course Content

Overview of Nano-Electronics

Nano-scale electronics; Foundation of nano-electronics – low dimension transport, quantum confinement, Coulomb blockade and quantum dot; Ballistic transport and Quantum interferences; Landauer formula, quantization of conductance, example of Quantum point contact.

Two-Terminal Junction Transistors

Basic CMOS process flow; MOS scaling theory; Issues in scaling MOS transistors; Requirements for non-classical MOS transistor; PMOS versus NMOS; Design and construction of MOS capacitor; Integration issues of high-k MOS – interface states, bulk charge, band offset, stability, reliability; MOS transistor and capacitor characteristics.

Gate Transistors

Metal gate transistors – motivation, basics and requirements; quantum transport in nano MOSFET; Ultrathin body silicon on insulator (SOI) – double gate transistors; Vertical transistors – FinFET and surround gate FET; compound semiconductor MOSFET – Hetero-structures MOSFET.

Sensors and Actuator Characteristics

Basics: types and working principles of sensors and actuators; Characteristic features: Range, Resolution, Sensitivity, Error, Repeatability, Linearity and Accuracy, Impedance, Nonlinearities, Static and Coulomb Friction, Eccentricity, Backlash, Saturation, Dead-band, System Response, First Order System Response, Under-damped Second Order System Response, Frequency Response.

Memory Devices and Sensors

Nano ferroelectrics – Ferroelectric random access memory –Fe-RAM circuit design – ferroelectric thin film properties and integration – calorimetric -sensors – electrochemical cells – surface and bulk acoustic devices – gas sensitive FETs – resistive semiconductor gas sensors –electronic noses – identification of hazardous solvents and gases – semiconductor sensor array.

References

1. W. Ranier, “Nano Electronics and Information Technology”, Wiley, 2003.
2. K.E. Drexler, “Nano systems”, Wiley, 1992.
3. M.C. Petty, “Introduction to Molecular Electronics”, Oxford University Press, New York, 1995.
4. Handbook of Nanoscience, Engineering and Technology”, Kluwer publishers, 2002.
5. G. Cao, “Nanostructures & Nanomaterials: Synthesis, Properties &Applications” Imperial College Press, 2014.

UECG005	PRINCIPLES OF VLSI SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives

- To learn the principles of operation of MOS transistors
- To impart knowledge on the design of digital VLSI circuits using MOS transistors.
- To learn the basics of FPGA implementation.

Course Content

MOS Transistor Principle

NMOS and PMOS transistor operations, MOS DC Equations, Electrical properties of CMOS circuits and device modeling, Scaling principles CMOS inverter, Second Order Effects, Stick diagram.

Combinational Logic Circuits

MOSFETs as switches, Basic Logic Gates in CMOS, Examples of Combinational Logic Design, RC Delay Model, Linear Delay Model, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design.

Sequential Logic Circuits

Static and Dynamic Latches and Registers, Timing issues, Memory architecture and memory control circuits.

Arithmetic Building Blocks

Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, Multipliers, speed and area tradeoff

Implementation Strategies

Full custom and Semi-custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures, Xilinx FPGA.

References

1. Jan Rabaey, Anantha Chandrakasan, B.Nikolic, "Digital Integrated Circuits: A Design Perspective", Second Edition, Prentice Hall of India, 2013.
2. M.J. Smith, "Application Specific Integrated Circuits", Addisson Wesley, 2001.
3. A.Pucknell, Kamran Eshraghian, "BASIC VLSI Design", Third Edition, Prentice Hall of India, 2009.
4. Weste and Harris, "CMOS VLSI DESIGN: A Circuits and Systems Perspective", Fourth edition, Pearson Education, 2010.
5. N.Weste, K.Eshraghian, "Principles of CMOS VLSI Design", Second Edition, Addison Wesley, 2009.

GENERIC ELECTIVES OFFERED BY MECHANICAL ENGINEERING

UMEG001	AUTOMOTIVE FUNDAMENTALS	L	T	P	C
		3	0	0	3

Course Objectives

- To provide knowledge on IC Engines, braking, transmission, suspension, starting systems.
- To import knowledge in new combustion techniques used for various fuels and alternative sources.

Course Content

Vehicle structure, Engine

Types of automobiles, vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics, IC engines –components function and materials

Engine auxiliary systems

Electronically controlled gasoline injection system for SI engines and diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Variable valve timing (VVT), Firing order.

Transmission Systems

Types of transmission, Clutch: Types diaphragm clutch, single and multi-plate clutch, centrifugal clutch and construction, Gear box: Types - gear selector and shifting mechanism, over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints, Differential and rear axle.

Brakes and Suspension Systems

Suspension system: Types of Suspension Systems-front and rear suspension, Braking system: Types of brakes, Mechanical, Hydraulic, and Air brakes, Disc & Drum brakes, Engine brakes, anti-lock braking system (ABS).

Alternative Energy Sources and Emission Control

Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles. Electric and Hybrid Vehicles, Fuel Cell. Engine emission: Automotive air pollution, emission control, Engine emission control by three-way catalytic converter system, Emission norms (Euro and BS).

References

1. Kirpal Singh, “Automobile Engineering”, Standard Publishers, Vol-I & II. 13th edition. New Delhi, 2014.
2. R. K. Rajput, “A Text book of Automobile Engineering”, Lakshmi publication, 2nd edition. 2014
3. Heniz Heisler, “Vehicle and Engine Technology”, SAE, 2nd edition. 2009.
4. Julian Happian Smith, “An Introduction to Modern Vehicle Design”, Butterworth-Heinemann, New Delhi, 2002.
5. Gupta R B, “Automobile Engineering", Satya Prakashan, 2015.

UMEG002	COMPUTER AIDED DESIGN	L	T	P	C
		3	0	0	3

Course Objective

- To provide an overview of how computers are being used in engineering component design
- To provide knowledge on different CAD standards

Course Content

Fundamentals of Computer Graphics

Product cycle- Design process- sequential and concurrent engineering- Computer aided design – CAD system architecture- Computer graphics – co-ordinate systems- 2D and 3D transformations homogeneous coordinates - Line drawing -Clipping- viewing transformation

Geometric Modeling

Representation of curves- Hermite curve- Bezier curve- B-spline curves-rational curves-Techniques for surface modeling – surface patch- Coons and bicubic patches. Solid modeling techniques- CSG

Visual Realism

Hidden – Line-Surface-Solid removal algorithms – shading – colouring – computer animation.

Assembly of Parts

Assembly modelling – interferences of positions and orientation – tolerance analysis-mass property calculations – mechanism simulation and interference checking.

CAD Standards

Standards for computer graphics- Graphical Kernel System (GKS) - standards for exchange images- Open Graphics Library (OpenGL) - Data exchange standards - IGES, STEP, CAL Setc. Communication standards.

Reference

1. Ibrahim Zeid, “Mastering CAD CAM”, Tata McGraw-Hill Publishing Co.2007
2. Chris McMahon and Jimmie Browne, “CAD/CAM Principles", "Practice and Manufacturing management”, 2nd edition, Pearson Education, 1999.
3. William M Neumann and Robert F.Sproul, “Principles of Computer Graphics”, McGraw Hill Book Co. Singapore, 1989.
4. Donald Hearn and M. Pauline Baker, “Computer Graphics”, Prentice Hall, Inc, 1992.
5. Foley, Wan Dam, Feiner and Hughes,"Computer graphics principles & practice", Pearson Education - 2003.

UMEG003	INTRODUCTION TO POWER PLANT ENGINEERING	L	T	P	C
		3	0	0	3

Course Objective

- To providing an overview of power plants and detailing the role of Engineers in their operation and maintenance.
- To impart knowledge on renewable power sources and operating cost.

Course Content

Layout of power plants

Layout of Steam, Hydel, Diesel, Nuclear and Gas Turbine Power Plants - Combined Power Cycles – Comparison and Selection

Nuclear and Hydro power plants

Nuclear Energy – Fission, Fusion Reaction, Types of Reactors, Waste Disposal and safety. Hydroelectric power plants – runoff storage and pumped storage type, Selection of Turbines

Diesel and Gas Power plants

Types of Diesel Plants, Components, Selection of Engine Type, Applications, environmental hazards – Gas Turbine Power Plant – Fuels – Gas Turbine Material – Regeneration and Intercooling.

Solar, tidal, wind power plants and economic issues of power plants

Geo thermal –Fuel cells – Tidal - Solar thermal central receiver system – wind power plants -Cost of Electric Energy – Fixed and operating Costs – Energy Rates – Types of Tariffs.

Reference

1. EI- Wakil M. M, “Power Plant Technology”, McGraw-Hill, 2nd edition, 2014.
2. Arora S. C and Domkundwar S, “A course in Power Plant Engineering”, Dhanpatrai, Third Edition, 2012.
3. Nag P.K, “Power Plant Engineering”, Tata McGraw-Hill, 2014.
4. G. D. Rai, “Introduction to Power Plant Technology”, Khanna Publishers, Third Edition, 2014.
5. T. Morse Frederick, “Power Plant Engineering”, Prentice Hall of India, Third Edition, 2014.
6. Culp A. W., “Principles of Energy Conversion”, McGraw Hill, Second Edition, 2014.

UMEG004	INTRODUCTION TO ROBOTICS	L	T	P	C
		3	0	0	3

Course Objectives

- To impart knowledge about automation, various sensors and their applications in robots.
- To learn about Robot Programming methods & Languages of robot.

Course Content

Introduction

Automation and robotics –History of robotics - Definition of a Robot - Basic concepts - Robot configurations - Types of Robot drives - Basic robot motions - Point to point control - Continuous path control.

Components and Operations

Basic control system concepts - control system analysis - robot actuation and fed back, Manipulators - direct and inverse kinematics, Coordinate transformation - Brief Robot dynamics. Types of Robot and effectors - Grippers - Tools as end effectors - Robot/End - effort interface.

Sensing and Machine Vision

Range sensing - Proximity sensing - Touch sensing - Force and Torque sensing. Introduction to Machine vision - Sensing and digitizing - Image processing and analysis.

Robot Programming

Methods - languages - Capabilities and limitation - Artificial intelligence - Knowledge representation - Search techniques - A1 and Robotics.

Industrial Applications

Application of robots in machining - Welding - Assembly - Material handling - Loading and unloading - CIM - Hostile and remote environments.

References

1. S.R. Deb, “Robotics Technology and flexible automation”, Tata McGraw-Hill Education., 2010
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, “Industrial Robotics, Technology programming and Applications”, McGraw Hill, 2012.
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, “Robotics Engineering an Integrated Approach”, PHI Learning, 2011.
4. K.S. Fu., R.C.Gonalez, C.S.G.Lee, “Robotics Control Sensing ", Vision and Intelligence, McGraw Hill International Edition, 2000.
5. Craig J.J., “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.

UMEG005	3D PRINTING	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the various RPT processes adopted to produce parts.
- To impart knowledge on three dimensional printing, reverse engineering, new technologies and their influence in manufacturing.

Course Content

Fundamentals of RPT

RPT History, Development of RP systems, Applications in Product Development, Rapid Tooling, Rapid Manufacturing- Principle –Fundamental – File format – Other translators – medical applications of RP-Materials for Rapid Prototyping Systems

Liquid Based and Solid based Rapid Prototyping Systems

Liquid based system - Stereolithography Apparatus (SLA), details of SL process, products, Advantages, Limitations, Applications and Uses. Solid based system - Fused Deposition Modeling, principle, process, products, advantages, applications and uses - Laminated Object Manufacturing

Powder Based Rapid Prototyping Systems

Selective Laser Sintering – principles of SLS process, principle of sinter bonding process, Laser sintering materials, products, advantages, limitations, applications and uses.

Three Dimensional Printing

Process, major applications, research and development. Direct shell production casting – key strengths, process, applications and uses, case studies, research and development

Reverse Engineering and New Technologies

Reverse Engineering - Introduction, measuring device- contact type and non-contact type, CAD model creation from point clouds-preprocessing, point clouds to surface model creation, medical data processing - types of medical imaging, software for making medical models, medical materials, and other applications.

References

1. Douglas Bryden, “CAD and Rapid Prototyping for Product Design”, Laurence King, 2014.
2. Kalani Kirk Hausman, Richard Horne, “3D Printing For Dummies”, Wiley Publications, 2014.
3. Chee Kai Chua, Kah Fai Leong, Chu Sing Lim “Rapid Prototyping: Principles and Applications” World Scientific Publication Pvt Ltd, 2011.
4. Chua C. K, Leong K. F and Lim C. S, “Rapid Prototyping: Principles and Applications”, World Scientific, Second edition, 2010.
5. Ian Gibson, “Advanced Manufacturing Technology for Medical applications: Reverse Engineering, Software conversion and Rapid Prototyping”, Wiley, 2006.

GENERIC ELECTIVES OFFERED BY INFORMATION TECHNOLOGY

UITG001	BIG DATA ANALYTICS AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

Course Objectives

The students should be made to:

- Understand various basic concepts related to big-data analytics.
- Understand the basics of Hadoop
- Gain knowledge on the real-time applications of big data.

Course Content

Introduction to Big Data

Introduction – distributed computing – Need of distributed computing for Big Data– Evolution of data management–Understanding the data – Defining big data – characteristics of Big Data – Big Data and its importance– Big Data analytics–Traditional and advanced analytics. Big Data Types - Structured data - Unstructured data - Semi structured data.

Introduction to Hadoop

Big Data – Apache Hadoop & Hadoop Ecosystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce - Data Serialization.

Big Data Applications

Big Data in Health care – Big Data contributions to Education - Big Data contributions to Insurance Services - Big Data Contributions to Industrial and Natural Resources - Big Data Contributions to Transportation - Big Data Contributions to Banking Zones and Fraud Detection.

References

1. Chris Eaton, Dirk deroos, “Understanding Big data”, McGraw Hill, 2012.
2. Judith Hurwitz, Alan Nugent et al., “Big Data for Dummies”, John Wiley & Sons, Inc, 2013.
3. Vignesh Prajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
4. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
5. Jy Liebowitz, “Big Data and Business Analytics”, CRC press, 2013.

UITG002	CLOUD COMPUTING FUNDAMENTALS	L	T	P	C
		3	0	0	3

Course Objectives

The students should be made to:

- Understand various basic concepts related to cloud computing technologies.
- Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS
- Gain knowledge on the concept of cloud virtualization, cloud storage, data management and data visualization.
- Understand different cloud programming platforms and tools.

Course Content

Cloud computing and cloud services

Introduction to Cloud Computing - History of Cloud computing - Types of Clouds Characteristics of Cloud Computing - Cloud Architecture - Cloud Storage - Cloud Services Benefits from Cloud Computing - Pros and Cons of Cloud Computing - Applications of Cloud Computing. Web based applications - Advantages of cloud development - Disadvantages of cloud development - Types of Cloud Service Development: Software as a Service - Platform as a Service Web Services - On demand Computing - Discovering Cloud services development services and tools.

Virtualization technology and services

Introduction - Virtualization Defined - Virtualization benefits - Server Virtualization - Virtualization for x86Architecture - Hypervisor Management Software - Virtual Infrastructure Requirements. Exploring Online Calendar Applications: Google Calendar - Yahoo Calendar - Windows Live Calendar - Apple MobileMe calendar - Exploring Online Scheduling Applications - Exploring Online Planning.

Collaborating with cloud

Evaluating Web mail services - Evaluating Instant Messaging Services - Evaluating Web Conferencing Tools – Collaborating via social networks and group ware - Collaborating on budgets.

References

1. Rajkumar Buyya, Christian Vacchiola, S Thamarai Selvi, “Mastering Cloud Computing”, First Edition ,McGraw Hill Publications, 2013.
2. Michael Miller, “Cloud Computing: Web-Based Applications that Change the way you Work and collaborate Online”, Pearson publications Aug 2008.
3. Dr.Kumar Saurabh, “Cloud Computing”, Wiley India Publictions, Second Edition Aug 2014.
4. Kai Hwang, Geoffrey C.Fox, Jack J.Dongarra, “Distributed and Cloud Computing: From Parallel Processing to the Internet of Things”, First Edition Morgan Kaufmann Publisher, an imprint Elsevier 2012.
5. Arshdeep Bahga, Vijay K.Madisetti, “Cloud Computing: A Hands on Approach", First Edition, VPT Publisher 2014.

UITG003	FUNDAMENTALS OF INTERNET OF THINGS	L	T	P	C
		3	0	0	3

Course Objectives

The students should be made to:

- Understand various basic concepts related to Internet of Things.
- Understand the elements involved in Internet of Things.
- Explore the various real-time applications which can be automated using Internet of Things.

Course Content

Fundamentals of IOT

Introduction - Definition and Characteristics of IoT - Physical design - IoT Protocols Logical design - IoT communication models, IoT Communication APIs - Enabling technologies - Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates - Domain specific IoTs - IoT Architectural view - IoT and M2M- difference between IoT and M2M - IoT systems management – Needs - NETCONF, YANG - IoT design methodology.

Elements of IOT

Sensors and actuators - Communication modules – Zigbee - LoRa - RFID - Wi-Fi - Power sources-IoT platforms – Introduction to Arduino and Raspberry Pi - Cloud Computing in IoT - Cloud Connectivity - Big Data Analytics-Data Visualization.

Challenges in IOT and case studies

Security Concerns and Challenges - Real time applications of IoT – Home automation – Automatic lighting – Home intrusion detection – Cities – Smart parking – Environment – Weather monitoring system – Agriculture – Smart irrigation.

References

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things-A hands-on approach", Universities Press, 2015.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things: Key applications and Protocols”, Wiley Publications 2nd edition, 2013.
3. Raj Kamal, “Internet of Things – Architecture and Design Principles”, Mc Graw Hill Education Pvt. Ltd., 2017.
4. “Internet of Things and Data Analytics”, HwaiyuGeng, P.E, Wiley Publications, 2017.
5. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014.

UITG004	INTRODUCTION TO DATABASE MANAGEMENT SYSTEM	L	T	P	C
		3	0	0	3

Course Objectives

The students should be made to:

- Understand various basic concepts related to database.
- Understand the importance of relational modeling and normalization.
- Familiarize with the various queries that can be used for data retrieval.

Course Content

Introduction to DBMS

Overview - Purpose of Database System -– Views of data – Data Models – Database Languages —– Database System Architecture – Database users and Administrator – Entity–Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases

Relational model

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus – Normalization - Fundamental operations – Additional Operations- SQL fundamentals - Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views

Database applications

Proprietary DBMS vs Open Source DBMS –NoSQL – Databases for Social Networks – Introduction to Multimedia Databases.

References

1. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, Sixth Edition, McGraw Hill Education India Pvt. Ltd., 2016.
2. Atul Kahate, “Introduction to Database Management Systems”, Pearson Education, New Delhi, 2006.
3. Alexis Leon and Mathews Leon, “Database Management Systems”, Vikas Publishing House Private Limited, New Delhi, 2003.
4. Raghu Ramakrishnan, “Database Management Systems”, McGraw-Hill, Third Edition, 2014.
5. Bipin C Desai, “An Introduction to Database Systems”, Galgotia Publications Pvt Limited, Revised edition 2012.

UITG005	WEB INTERFACE DESIGN AND DEVELOPMENT	L	T	P	C
		3	0	0	3

Course Objectives

The students should be made to:

- Understand various basic concepts related to web designing.
- Understand the role of CSS in designing web pages.
- Understand the role of Java script in the design of interactive web pages.

Course Content

Html5

Introduction, New Elements, Canvas, SVG, Drag/Drop, Geolocation, Video, Audio, Input Types, Form Elements, Attributes, Semantic, Web Storage, App Cache, Web Workers, SSE.

CASCADING STYLE SHEETS

Introduction, Syntax, Id & Class, Backgrounds, Text, Fonts, Links, Lists, Tables, Box Model, Border, Outline, Margin, Padding, Grouping/Nesting, Dimension, Display, Positioning, Floating, Align, Pseudo-class, Pseudo-element, Navigation Bar, Image Gallery, Image Opacity, Image Sprites, Media Types, Attribute Selectors, CSS3 Introduction, Gradients, Text Effects, Fonts, 2D Transforms, 3D Transforms, Transitions, Animations, Multiple Columns.

JAVASCRIPT

Introduction, Comment, Variable, Global Variable, Data Types, Operators, If Statement, Switch, Loop: for and while, Function, Objects, Array, Browser Object Model, Validation. **JQuery:** Introduction, Selectors, Events, CSS Classes, Dimensions.

References

1. Harvey Deitel, Abbey Deitel, “Internet and World Wide Web: How To Program”, 5th Edition, Pearson Education 2012.
2. DJ Editorial Services, “HTML5 Black Book”, Second Edition, Dream tech Press 2016.
3. Thomas A.Powell, “HTML & CSS: The Complete Reference”, Fifth Edition, Tata McGraw-Hill 2010 .
4. Thomas A.Powell and Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw-Hill, 2013.
5. Thomas A.Powell, “Web Design: The Complete Reference”, Second Edition, Tata McGraw-Hill, 2003.

GENERIC ELECTIVES OFFERED BY SCIENCE AND HUMANITIES

UGCC001	INDIAN CONSTITUTION, DEMOCRACY AND WORLD AFFAIRS	L	T	P	C
		3	0	0	3

Course Objectives

- To the study the Indian political system is a window to understanding politics in society.
- To learn the idea of political system and the account of the making and working of constitutional institutions
- To expose the students to the methods of qualitative and quantitative assessment of environmental impacts due to developmental activities.

Course Content

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review. State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.
Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries – Assessment of working of the Parliamentary System in India.

Current World Political Leaders- World Geography Issue Analysis - international politics -international security issues, nuclear proliferation, arms control, environmental politics, foreign policy analysis – Migration - Global wealth and poverty – Globalization - an overview - Territorial Conflicts.

References

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi.
2. Granville Austin, "Indian Constitution Cornerstone of a Nation", Oxford Publication.
3. Granville Austin (1999), "Working Democratic Constitution: The Indian Experience", Oxford Publication.
4. Sharma, Brij Kishore, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi.
5. Timothy Dunne and Steve Smith, eds., "International Relations Theories: Discipline and Diversity", Oxford University Press, 2007.

UGCC002	FUNDAMENTALS OF ASTROPHYSICS	L	T	P	C
		3	0	0	3

Course Objectives

- To learn the fundamental concepts in astrophysics that will equip in better understanding of the stellar classification, spectroscopy, solar system and planetary motion.
- To provide students with a detailed overview of galactic and extragalactic astronomy as well as solar system studies.

Course Content

Historical Astronomy of Indian and western - astronomy - Aryabhatta, Tycho Brahe, Copernicus, Galileo - Olbers paradox - solar system satellites, planets, comets, meteorites, asteroids. Size and Time Scales - Stars – Spectra – Classification - Stellar Structure Equations and Survey of Stellar Evolution - Stellar Oscillations - Degenerate and Collapsed Stars - Radio Pulsars.

Interacting Binary Systems - Accretion Disks - X-ray Sources - Gravitational Lenses - Dark Matter - Interstellar Medium - HII Regions - Supernova Remnants - Molecular Clouds – Dust - Radiative Transfer - Jeans' Mass - Star Formation.

High-energy Astrophysics - Compton Scattering – Bremsstrahlung - Synchrotron Radiation - Cosmic Rays - Galactic Stellar Distributions and Populations - Oort Constants - Oort Limit. White Dwarfs - Neutron Stars - Black Holes - Hubble Expansion - Charting the Expansion - Astronomical Instrumentation -Telescopes & Observations.

References

1. Hansen, Carl J, Steven D. Kawaler, and Virginia Trimble, “Stellar Interiors: Physical Principles, Structure and Evolution”, New York, NY: Springer, 2004. ISBN: 9780387200897.
2. Carroll, Bradley W, and Dale A. Ostlie, “An Introduction to Modern Astrophysics. Reading”, MA: Addison-Wesley Pub., 1995. ISBN: 9780201547306.
3. Kippenhahn, Rudolf, and Alfred Weigert, “Stellar Structure and Evolution”, New York, NY: Springer-Verlag, 1990. ISBN: 9780387502113.
4. Shapiro, Stuart L, and Saul A. Teukolsky, “Black Holes, White Dwarfs, and Neutron Stars”, New York, NY: Wiley, 1983. ISBN: 9780471873167.
5. William Marshall Smart, and Robin Michael Green, “On Spherical Astronomy”, (Editor) Carroll, Bradley W Cambridge University Press, 1977.

UGCC003	FUNDAMENTALS OF BIOCHEMISTRY	L	T	P	C
		3	0	0	3

Course Objectives

- To provide an integrated knowledge to understand the structure and functions of biomolecules.
- To interpret the biochemical process using analytical techniques.

Course Content

Proteins and Amino acids: Introduction to amino acid, structure, properties (physical, chemical) Titration of amino acid. Essential and non-essential amino acid. Protein Introduction to protein, classification of protein based on solubility, shape, composition, function and polarity. Peptide bond – Structure of peptide bond. Denaturation– renaturation of protein, properties of protein. Introduction to lipoprotein, glycoprotein and nucleoprotein. Biological function of protein. Protein structure-Primary, Secondary, tertiary and Quaternary type.

Carbohydrates: Monosaccharides, disaccharides, oligosaccharides- and polysaccharides- types, characteristics and properties, biological significance. Lipids-Classification, structure, properties, biological significance.

Separation techniques: Chromatography- Thin-layer, paper chromatography, Column chromatography, High Performance Liquid Chromatography (HPLC)- Analytical techniques - Basic principle, laws of absorption (Lambert - Beers law). Instrumentation for UV -Visible and IR Spectrophotometry and their applications.

References

1. Sadasivam S and Manickam A, “Biochemical methods”, New Age International Pvt Ltd, Revised Edition, 2018.
2. Albert Lehninger, Michael Cox and David L. Nelson, “Principles of Biochemistry”, W. H. Freeman & Company, 2017
3. Elsa Lundanes, Leon Reubsaet and Tyge Greibrokk, “Chromatography”, Wiley VCH Revised Edition 2013
4. Donald Voet, Judith G. Voet and Charlotte W. Pratt, “Principles of Biochemistry”, John Wiley & Sons,2012
5. Rastogi S C, “Biochemistry”, McGraw Hill Inc., New Delhi, 2nd edition,2003.

UGCC004	STATISTICAL INFERENCES AND APPLICATIONS	L	T	P	C
		3	0	0	3

Course Objectives

- To provide students with theoretical foundations and methods of theory of statistics.
- Understand basic theory behind the development and assessment of statistical analysis techniques in the areas of point and interval estimation, as well as hypothesis testing
- To learn basic theoretical knowledge about fundamental principles for statistical inference.

Course Content

Data collection and treatment: Data Collection and organization, diagrammatic representation of data (bar, pie, 2-D and 3-D diagrams), standard deviation and standard error of means, co-efficient of variation, Correlation and regression analysis. Probability and Distributions: Bayer's theorem, probability theorem, elements of binomial and Poisson distribution, normal distribution curve and properties.

Point Estimation: : Estimator and methods of estimation, Properties of an estimator: Consistency, Unbiasedness, Efficiency and Sufficiency- Neyman Factorization, Cramer-Rao Bound Testing of Hypotheses: Tests of hypotheses, simple and composite hypotheses, types of error, Neyman-Pearson Lemma, families with monotone likelihood ratio, UMP, UMP unbiased and UMP invariant tests. Likelihood ratio tests - applications to one sample and two sample problems, Chi-square tests. Wald's sequential probability ratio test.
Interval estimation: methods for finding confidence intervals, shortest length confidence intervals.

Classical inference: Frequentist and Bayesian inference, maximum likelihood estimation. Traditional computer-based methods: Empirical Bayes, ridge regression, generalized linear models, regression trees, survival analysis and the EM-algorithm. Computer-intensive methods as resampling, resampling based confidence intervals, cross validation, large-scale hypothesis testing, sparse regression models, random forests, and boosting. Bioinformatic application examples.

References

1. Roger E. Kirk, Statistics an introduction, Thomson Wadsworth, 2008.
2. V.K. Rohatgi & A.K. Md. E.Saleh, "An Introduction to Probability and Statistics", 3rd Edition, Wiley, 2015
3. E.J. Dudewicz & S.N. Mishra, "Modern Mathematical Statsitics", Wiley, 1988.
4. Introduction to the Theory of Statistics by A.M. Mood, F.A. Graybill and D.C. Boes, McGraw-Hill 1974.
5. Efron, Bradley; Hastie, Trevor, "Computer age statistical inference: algorithms, evidence, and data science", New York, NY: Cambridge University Press, 2016.

GENERIC ELECTIVES OFFERED BY MASTER OF BUSINESS ADMINISTRATION

UMGG001	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	0	0	3

Course Objectives

- To develop necessary knowledge and skills for entrepreneurship
- Develop and strengthen entrepreneurial quality
- Understand the process and procedure involved in setting up enterprises

Course Content

Entrepreneurship concept, Characteristics of Successful Entrepreneur, Knowledge and Skills of Entrepreneur, Central and State Government Industrial Policies and Regulations.

Prefeasibility Study, Criteria for Selection of Product, Capital Budgeting, Feasibility Report Preparation and Evaluation Criteria

Finance and Human Resource Mobilization, Operations Planning, Market and Channel Selection, Growth Strategies, Product Launching, Incubation, Venture capital

References

1. S.S.Khanka, "Entrepreneurial Development"; S. Chand & Co. Ltd., 2011.
2. Hisrich R D and Peters M P, "Entrepreneurship"; Tata McGraw-Hill, 5th Edition, 2012.
3. Mathew Manimala, "Entrepreneurship Theory at the Crossroads", Paradigms & Praxis, Biztrantra 2nd Edition , 2009
4. Prasanna Chandra, "Projects – Planning, Analysis, Selection, Implementation and Reviews", Tata McGraw-Hill, 2015.
5. Rabindra N. Kanungo; "Entrepreneurship and Innovation"; Sage Publications, 2014.

UMGG002	INTELLECTUAL PROPERTY RIGHTS	L	T	P	C
		3	0	0	3

Course Objectives

- To acquire knowledge about the intellectual property rights.
- To learn the procedure for registering Patents, Copy Rights, Trademarks and Geographical Indication
- To protect one's intellectual property rights

Course Content

Introduction to IPR, International cooperation on IPR, Major Treaties, International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

Nature &Importance of Patents, Copy Rights, Trade Marks, Geographical Indication. Procedure to file Application for grant of Patents, Copy rights, Trade Marks and Geographic Indication.

Emerging trends in IPR, IPR litigation, Case Studies on Patents, Copyright and related rights, Trade Marks, geographic indications

References

1. Bare Acts (Up-to-date)
2. Subbaram N. R., and Viswanathan S., "Handbook of Indian Patent Law and Practice", Printers and Publishers Pvt. Ltd., 2008.
3. Susan K. Sell, "Private Power, Public Law: The globalization of Intellectual Property Rights", Cambridge studies in International relations, Cambridge University Press, 2013.
4. Wadehra, B.L., "Law relating to Intellectual Property", University law publishing company Pvt Ltd, 4th Edition, 2010.
5. Bhandari, M.K., "Law Relating to Intellectual Property Rights", Central Law Publications, 4th Edition, 2015.

UMGG003	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives

- To determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization.
- To apply and evaluate best practices for the attainment of total quality.
- To expose the students to the quality management systems and standards.

Course Content

Quality, TQM framework, Customer Focus, Customer retention, Product and service quality, Quality Cost,, Taguchi techniques, Quality circle, Japanese 5S principles and 8D methodology.

Statistical process control, Control charts, Process capability, Six sigma, Reliability, and Business process re-engineering (BPR). Tools and Techniques for Quality Management - Quality Functions Deployment (QFD), Failure Mode Effect Analysis (FMEA), Total Productivity Maintenance (TPM).

Quality management systems, IS/ISO 9000, Performance improvements, Quality Audits, TQM culture, Leadership, Quality council, Employee involvement, Motivation, Empowerment, Recognition and Reward.

References

1. Dale H. Besterfield, et. al., "Total Quality Management", Pearson Education, Revised 3rd Edition, 2011.
2. Lal, H., "Total Quality Management: A Practical Approach", New Age International publication, 2015.
3. Douglas C. Montgomory, "Introduction to Statistical Quality Control", Wiley Student Edition, Wiley India Pvt Limited, 7th Edition, 2012.
4. James R. Evans and William M. Lindsay, "The Management and Control of Quality", Thomson, 8th Edition, 2010.
5. Indian standard – "Quality Management Systems – Guidelines for performance improvement", Bureau of Indian standards, New Delhi.

UMGG004	HUMAN RIGHTS AND HUMAN VALUES	L	T	P	C
		3	0	0	3

Course Objectives

- To understand values and its importance
- To know human rights and duties.
- To understand the duty towards women and society.

Course Content

Values and Self-Development - Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non-moral valuation, Standards and principles, Value judgments. Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

Human Rights and Duties: United Nations declaration, Role of various agencies in protection and promotion of human rights. Computer Ethics: Social Impact of Computer, Gender-Issues and Privacy, Cyber Crime, Ethical use of Software. Protection of women at work place.

The Constitution of India - Philosophy of Constitution, Fundamental Rights and Fundamental Duties, Organs of the State - Legislature, Executive, and Judiciary – their composition scope and activities, Judiciary as the guardian of fundamental rights – Writs as constitutional remedies –types of Writs.

References

1. Basu D. D, “Introduction to the Constitution of India”, Lexis Nexis, New Delhi, 2014.
2. “Value Education and Human Rights”, Isha books, New Delhi, 2012
3. Kapoor S.K, “International Law and Human Rights”, Central Law Agency, New Delhi, 2016.
4. Chakraborty S.K, “Values and Ethics for organizations: Theory and Practice”, Oxford University Press, New Delhi, 2001.

UMGG005	SUPPLY CHAIN MANAGEMENT AND LOGISTICS	L	T	P	C
		3	0	0	3

Course Objectives

- To understand the Logistics and SCM Role in the Organization
- To apply theory on logistics in Customer Service, Procurement and Outsourcing
- To enhance the knowledge about supply chain processes and its management.

Course Content

Introduction: Definition –Scope and Importance of logistics – Logistics-"A system concept"- Logistics functions – Customer value chain – The importance of supply chain flows –Logistics and Competitive advantage –Drivers of supply chain and performance –Integrating logistics within organization.

Supply Chain Management: Introduction- Objectives – Role of logistics in supply chain –Functions and contribution of supply chain management –Warehouse function –Purpose of warehouses – Modes of transport –Freight Management

Logistics Outsourcing and Logistics Information System: Role of sourcing in a supply chain – Supplier selection and contracts –The procurement process –Supplier selection –The role of IT in the supply chain –Supplier relationship management – Logistics information needs –The role of e-business in supply chain.

References

1. Vinod V. Sople, "Logistics Management-The Supply Chain Imperative", Pearson, 2012.
2. Sunil Chopra, Peter Meindl and Kalra, "Supply Chain Management Strategy, Planning and Operations", Pearsons Education, 2016.
3. Martin Christopher, "Logistics and Supply Chain Management", Pearsons Education, 2016.
4. Richard B.Chase, Ravi Shankar, Robert Jacobs," Operations and Supply Chain Management", SIE, 2014.
5. Leenders, Johnson, Flyn, Fearon, "Purchasing and Supply Management", Tata McGraw Hill, 2010.